THE CITY OF SPRINGFIELD MISSOURI

NPDES Storm Water Permit Annual Report
July 2004 – June 2005

National Pollutant Discharge Elimination System
Municipal Separate Storm Sewer System
Permit MO-0126322

Prepared by:
Storm Water Services Division
Department of Public Works
December 2005

Signatory Requirements

As required in Part VI.H of NPDES Permit MO-0126322, all reports for the Permit shall be signed by:

- *Either a principal executive officer or ranking elected official*

Any person signing documents under this section shall make the following certification:

> "I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations."

_____ _____

Tom Finnie — Date
City Manager

Table of Contents

List of Figures

List of Tables

List of Appendices

Industrial Facility Inspection Checklist
Inventory of Known Major Outfalls
Lab Analysis Sheets:
- Pesticide Data Analysis
- Acid/Base Neutral Organic Analysis
- Volatile Organic Analysis

A Final Report to the City of Springfield on the Biological Assessment of Urban Streams

C **Educational and Public Outreach Materials**

Brochures/Program Materials:
- Storm Water Services Division (brochure)
- Storm Water Pollution Prevention – What You Can Do At Home
- Storm Water Pollution Prevention – Business Tips and Guidelines
- Storm Water Pollution Prevention in the Automotive Business – Repair, Cleaning, Salvage
- Adopt-A-Stream
- Adopt-A-Stream Program Participants
- *Quality Ozark Streams* (City Utilities insert)

Activity Announcements:
- Construction Specifications Institute Trade Show – "Erosion/Sediment Control & Storm Water Issues" seminar
- Springfield Regional Arbor Day Activities
- Earth Day 2005

News Articles/News Releases:
- City of Springfield News Release – Citizens Reminded to Protect Our Waterways
- City of Springfield News Release – City Acquires Floodplain Area
- *Choose Environmental Excellence* Newsletter – Fall 2004 Page 3
- *Community Free Press Midweek* – "Protect our Waterways" and "Springfield Acquires Floodplain Area"
- *Springfield News-Leader* – "Splish, splash – kids get into water"
- *Springfield News-Leader* – "After 20 years, Ozarks seeing water issues more clearly"
- *Springfield News-Leader* – "Street signs let drivers know what creek they're crossing"
- *Springfield News-Leader* – "Change in an urban wilderness"
- *Springfield News-Leader* – "Rethinking old standards of storm drainage"
- *Springfield News-Leader* – "Now, it's up to you to clean streams"
- *Springfield News-Leader* – "Program aims to keep streams clean"
- *Springfield News-Leader* – "Program encourages residents to clean up Ozarks streams"

1.0 Introduction

This report documents the continued evolution of Springfield's Storm Water Management Program and activities related to the City of Springfield's (City) National Pollutant Discharge Elimination System (NPDES) Permit MO-0126322 issued by the Missouri Department of Natural Resources for the City's Municipal Separate Storm Sewer System (MS4). This Permit covers a five-year period from July 26, 2002 through July 25, 2007. This annual report provides the necessary documentation to fulfill the reporting requirements specified in Part V.D of the Permit for year three from July 1, 2004 through June 30, 2005. This report also serves as an overview of the significant activities implemented by the City to enhance water quality from the MS4. The City's Storm Water Services Division of Public Works compiled this report with assistance and input from Public Works Engineering, Operations, Sanitary Services, Solid Waste Management, and Street Maintenance divisions, along with the Springfield Fire Department, the Springfield-Greene County Parks Department, the Missouri Department of Transportation, and the South Missouri Water Quality Project.

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Department of Public Works
Storm Water Services Division

Mission

The Storm Water Services Division is committed to the advancement and continuous improvement of the quality of life for the citizens of Springfield by being a leader in the development of storm water solutions to meet the needs of the community and by placing the welfare and safety of the public above all other considerations.

This will be achieved through:

Quality Customer Service
By being prompt and courteous in responding to all service requests with a professional approach and a meaningful and helpful resolution.

Effective Communication
By taking the initiative to communicate openly with the public and to effectively communicate with neighborhoods on important local issues.

Cooperation with Partners
By developing partnerships with other organizations, groups and individuals with similar objectives and cooperating with those partners to increase the program effectiveness.

Education and Advancement
By being a recognized leader in public education by increasing community understanding of storm water priorities and goals.

Leadership and Excellence
By taking a leadership role in developing a model program through the utilization of advanced innovations and a commitment to excellence.

3.0 Storm Water Management Program Evaluation

A primary objective of Springfield's Storm Water Management Program (SWMP) is the implementation of **Best Management Practices** (BMPs) to protect and enhance the water quality of the MS4. The SWMP elements required in year three of the Permit have been implemented and are discussed in the Narrative Section of this report. The SWMP includes additional elements, which are highlighted below. These accomplishments have made a significant contribution towards enhancing the water quality of the region through sound storm water management principles.

Floodplain Acquisition Program

Following the 1993 floods, a Citizens Storm Water Committee was appointed by City Council to review Springfield's Storm Water Management Program. A primary recommendation of the Committee was the development of a Floodplain Acquisition Program to acquire flood-prone properties and undeveloped acreage within sinkhole boundaries and riparian (stream) corridors.

The City has invested approximately $10.3 million on this program since 1993. The community has benefited in terms of flood control, wildlife habitat, recreational opportunities, and enhanced water quality as a result of this program. The preservation and restoration of natural vegetation within the floodplains reduces erosion and serves as a filter to remove sediment, nutrients, and other pollutants in storm water runoff.

In addition, the preservation and expansion of buffer areas adjacent to sinkholes serves to protect groundwater quality. The City's sinkhole protection ordinance (City Code Sec. 96-6) restricts development in sinkholes, preventing the creation of new flooding problems while providing water quality benefits. An important tool for implementing BMPs near sinkholes is the *Springfield Area Watersheds and Sinkholes* map. This map, included in Appendix A, shows the boundaries and watersheds of approximately 250 sinkholes that cover an area of over 600 acres.

One key acquisition for water quality protection during year three was the purchase of 21 acres of riparian corridor along Jordan Creek in November 2004. The Storm Water Services Division issued a news release about this acquisition, prompting an educational article by the *Springfield News-leader* about the Floodplain Acquisition Program as well as publication of the news release in the *Community Free Press Midweek*. The news release and publications are included in Appendix C.

Figure 1 - Jordan Creek riparian corridor property purchased during year three

Properties acquired during 2004-2005:

Vacant floodplain property:

- 21 acres of riparian corridor along Jordan Creek
- 4 acres of riparian corridor along Fassnight Creek
- 2 acres on Melville Rd. for future regional detention
- 0.3 acres at Talmage and Newton

Flood-prone properties as part of storm water improvement projects to reduce potential flooding:

- 1 property in the Erie sinkhole area
- 8 properties along Fassnight Creek
- 1 property along Jordan Creek North Branch
- 1 property on Park Ave.
- 1 property on Kellett Ave.

Other flood-prone properties

- 1 property on Seminole St.

Capital Improvements Program

The citizens of Springfield have placed a high priority on improving quality of life through flood control and water quality enhancements. Voters approved storm water bond issues, funded through a Level Property Tax, in 1995, 1999, 2001, and 2004, totaling $56 million for storm water capital improvements and floodplain acquisitions. The 2004 initiative also included funding for BMPs and stream bank stabilization projects. Storm water capital improvements funded through bond issues and other sources have evolved from a single-purpose flood control objective to multi-purpose facilities that provide water quality enhancement, wildlife habitat, and recreational opportunities in addition to flood control. Public-private and public-public partnerships have been instrumental in the advancement of multi-purpose facilities. Storm water capital improvement projects constructed as well as assessments and design studies for capital improvements completed during year three are summarized below.

- **Stream Assessments.** The City contracted with Intuition & Logic Inc., a firm specializing in natural stream systems, to inventory and evaluate approximately 12 miles of urban waterways, including sections of Galloway Creek, South Creek, Ward Branch, Thompson Branch, and Ravenwood tributary. The final product includes digital mapping and cataloging of an extensive list of physical characteristics of each stream. In addition, a ranking system was produced to assist the City in establishing a prioritized project list for future stream stabilization projects.

- **Jordan Creek North Branch, Glenstone and Division.** In cooperation with the Missouri Department of Transportation (MoDOT) intersection widening project at Glenstone and Division, the Jordan Creek North Branch channel was reconstructed with increased capacity on the west side of Glenstone. Property acquisitions and removal of existing structures allowed for the creation of a grass buffer on the south side of the creek as shown in Figure 4.

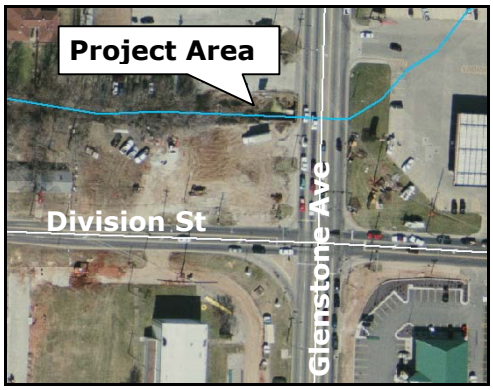


Figure 2 - Jordan Creek North Branch at Glenstone and Division project location

Figure 3 - Jordan Creek North Branch channel at Glenstone before the reconstruction project. The parking lot on the left is now a grass buffer.

Figure 4 - Jordan Creek North Branch channel reconstructed with large modular block wall and grass buffer.

- **Jordan Creek North Branch Daylighting Project.** Phase 1 of a two-phase project to "daylight" Jordan Creek North Branch from National to Fremont was completed. Daylighting is a term being used by many communities around the country to describe a project that removes old drainage tunnels and reconstructs the creek or natural drainage way, often along with the expansion of riparian corridors or the creation of parks or greenway trails.

Figure 5 - Jordan Creek North Branch Daylighting Project area

In this project, the inadequate capacity of the tunnel system is being replaced by an open system that can safely convey a 100-year flood through the neighborhood while utilizing bioengineering in the design to provide water quality enhancement as well as recreational opportunities. A mat system consisting of concrete blocks wired together was used to stabilize the creek bed. The concrete blocks contain open centers and spacing to allow vegetation to grow through, creating a natural appearance and providing water quality enhancement. Federal grant funding was obtained to construct a greenway trail. Phase 1 of the project from National to Prospect included a new box culvert and pedestrian underpass at National. Phase 2, scheduled for completion in 2006, will complete the daylighting project from Prospect to Fremont, including continuation of the trail to connect Smith Park with Silver Springs Park. This trail is part of the Vision 20/20 comprehensive greenways plan.

Figure 6 - Pre-project: Looking west between Prospect and National. The concrete top of the creek tunnel system is visible.

Figure 7 - Mid-project: Looking west between Prospect and National. The tunnel is being removed.

Figure 8 - Mid-project: Looking east between Prospect and National. Mat system is being installed in the newly graded creek channel.

Figure 9 – Post-project: Looking east between Prospect and National. Phase 1 of the project is complete with reconstructed creek channel and a trail for walking and biking.

- **Ward Branch at Weaver Road Box Culvert Design.** The City contracted with Intuition & Logic Inc., a firm specializing in natural stream systems, to develop a box culvert design for the Weaver Road crossing of Ward Branch. The objective was to accommodate a widened roadway with flood protection and minimize potential negative impacts to Ward Branch by implementing innovative design measures. The design includes a staged, self-cleaning box culvert, alignment and grade control to limit stream impacts, and riparian corridor re-vegetation plans. Construction is planned in 2-3 years depending on right-of-way acquisition.

Figure 10 - Ward Branch at Weaver Road box culvert design location

- **Main Avenue Box Culvert Replacement.** In partnership with BNSF Railway, the failing box culvert under the Main Avenue RR crossing was replaced. This box culvert is about 200 ft. north of Jordan Creek as shown in Figure 11.

- **Hampton Street Box Culvert Replacement.** Phase 3 of the Hampton Street box culvert project was completed, replacing the existing 3 x 4 box culvert with a 5 x 9 box culvert from St. Louis to Walnut. The first two phases replaced the downstream portion of the box to Jordan Creek. Completion of this project provides flood protection to Hammons Stadium and nearby streets.

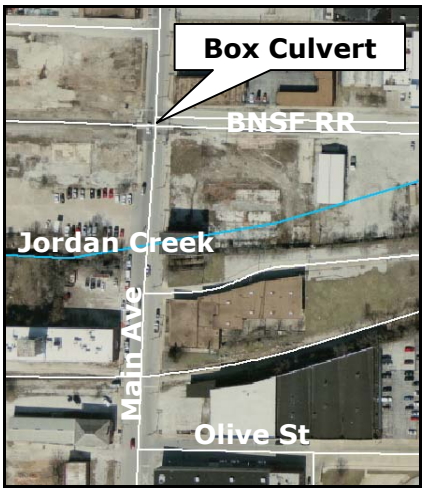


Figure 1 - Main Ave. box culvert replacement location

Figure 12 - Hampton box replacement location

- **South Creek Pedestrian Underpass.** The box culvert under Campbell Avenue was modified, adding a fourth cell to serve as a pedestrian underpass, allowing for the completion of this section of the South Creek greenways trail to the trailhead 1 mile east at National Ave.

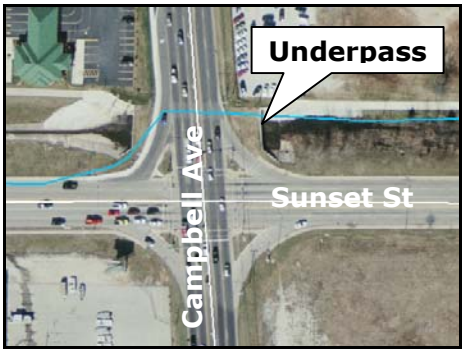


Figure 13 - South Creek pedestrian underpass Location

- **Cherry to McDaniel Storm Water Improvements.** Phase 1 of the project to enlarge the existing storm sewer from Cherry to McDaniel was completed. Six houses that previously flooded were purchased. The project will add grass and concrete channel, box culverts and curb and gutter on Walnut and Cherry to control and direct the storm water to this enlarged system. Phase 1 completed the construction from McDaniel through Walnut and provided drainage control along Walnut west of Barnes Ave. Phase 2 will complete the project to Cherry and provide drainage control along Cherry from Grandview to Miles Park.

Figure 14 – Pre-project: South Creek at Campbell

Figure 15 – Post-project: Pedestrian underpass

Figure 16 - Cherry to McDaniel storm water improvements area

Jordan Creek Feasibility Study

In the spring of 2004, the US Army Corps of Engineers began a feasibility study to identify cost-effective alternatives to mitigate long-standing flooding concerns and advance environmental restoration along Jordan Creek. Many businesses in the Jordan Creek floodplain experienced damages from the flood that occurred on July 12, 2000. In addition to flood mitigation, alternatives could also address failing infrastructure and other factors to protect water quality in Jordan Creek. The feasibility study will result in a recommended plan for capital projects that will undergo an approval process and subsequent construction. The City is assisting the Corps through a 50/50 cost share agreement with local matching funds and in-kind tasks. The cost of the study is $3 million and will take an estimated 4½ years to complete. The study continued on schedule during year three, including a topographical survey of the creek, an elevation survey of 700 structures along the creek, development of detailed hydraulic models, and cultural resource and baseline water quality studies.

Flood Hazard Mapping

As referenced in last year's report, FEMA floodplain areas along South Creek, Jordan Creek, and Galloway Creek have been remapped as part of a Cooperative Technical Partner agreement with FEMA in which floodplain remapping will be a cooperative effort that utilizes best available information and technology. In year three, the Ward Branch floodplain was restudied. The supporting models and delineations for these watersheds are currently under technical review and should be available for public comment in early 2006. The City is also developing City Flood Hazard Maps for flood-prone areas that are beyond the designated FEMA flood boundaries. As part of this effort, approximately 4.9 miles of the Inman Creek watershed was mapped in year one. Additional floodplain and flood hazard mapping is scheduled on a priority basis.

Watershed Assessments

The City continues to work toward the development of comprehensive watershed master plans. In year two, the City implemented a watershed assessment approach to lay the groundwork for future studies. Using this approach, a series of maps is created for a watershed showing the soil types, current and projected future land uses, flood hazard boundaries, MS4 system inventory, and sinkholes. An interactive flood map is created that provides an instantaneous look at flow rates at various points within the watershed. Also as part of the assessment process, maps of stream buffers are being created to guide the implementation of stream protection buffers for new developments. Consideration is being given to implementing stream protection buffers in new developments as part of the storm water drainage criteria manual currently being developed. In year two, the first assessments using this prototype were completed for the Jordan Creek North Branch and Inman Creek watersheds. Additional watershed assessments will be accomplished as available staff time allows.

Vision 20/20 Water Quality Planning Group

In 2003, the City and Greene County initiated an effort to continue implementation of the Vision 20/20 Comprehensive Plan developed in the mid 1990's by developing a strategic action plan for the next five years. The citizen-based Planning Groups began meeting in June 2003. The *2004 Vision 20/20 Strategic Plan for Springfield and Greene County* containing the groups' recommendations was presented to the City and County on June 24, 2004. The recommendations of the Water Quality Planning Group reflect strong community support for storm water management and other water quality issues and were adopted by City Council and the County Commission as a guide for developing policies to address these issues.

The recommendations of the Water Quality Planning Group reflect strong community support for storm water management and other water quality issues.

Storm Water Drainage Criteria Revision

The City has contracted with Wright Water Engineers and Intuition & Logic Inc. to update the City's storm water drainage criteria. Several chapters of the storm water drainage criteria manual have been drafted with completion expected in 2006. The manual is being drafted as a comprehensive document of policies, guidelines, and specific design criteria for storm water management and BMPs. It emphasizes a watershed approach to storm water management that controls flooding for design flood events while protecting water quality, stream channels, habitat and groundwater.

Habitat for Humanity LID Subdivision Project

Greene County is working with Habitat for Humanity (HFH) on a cooperative project in which the County is providing the site design of a new HFH subdivision to demonstrate low impact development (LID) concepts to minimize storm water runoff and protect water quality. The City's Public Works Department is providing technical assistance on the design and landscaping of the subdivision. The Show-Me Yards & Neighborhoods (SMY&N) program is providing technical assistance for the subdivision to meet the program requirements for certification. The project will provide hands-on experience for City and County staff on the practical application of LID concepts and will be a demonstration site that can be used when working with other private developers in the future.

Greene County and the City are working with Habitat for Humanity to demonstrate low impact development (LID) concepts to minimize storm water runoff and protect water quality.

Watershed Center

Planning is underway for the Watershed Center, an education and demonstration facility, at the Valley Water Mill site in north Springfield. The Valley Water Mill Task Force, formed in 2000 as a part of the Watershed Committee of the Ozarks (WCO), has developed a concept plan that includes outdoor classroom "learning stations", trails, a restored wetland, examples of karst geology, native planting areas, an Audubon Society viewing area, a Mo. Department of Conservation Center fishing dock, and a comprehensive on-site wastewater treatment training center. The Springfield-Greene County Parks Dept. Outdoor Recreation ~Initiatives program will also be housed at the Center. The Valley Water Mill Task Force Education Sub-Committee drafted an education plan for the Center that includes demonstrations and workshops on storm water BMPs, the Show-Me Yards & Neighborhoods Program, low impact development, and sediment and erosion control. The target date for beginning construction on the main Watershed Center facility is summer 2006. The City provides financial support to the WCO as a significant part of its public education and outreach program. More information is available at www.watershedcommittee.org.

The Discovery Center of Springfield Green Building Expansion Project

In September 2004, The Discovery Center of Springfield, an interactive, hands-on museum and educational resource center, broke ground on a building expansion project that will be LEED-Certified through the U.S. Green Building Council. The project's sustainable design includes components that address storm water runoff including a vegetated roof and a storm water collection system for use in toilet flushing. City of Springfield staff members from the Planning and Public Works Departments are serving as Volunteer Team Members for the project.

City Tree Programs

The City provides tree care and maintenance and promotion of community forestry through a number of programs and services. According to American Forests, trees provide measurable benefits in reducing storm water runoff and improving water quality (Beattie 2000). The Public Grounds Section of the Public Works Operations Division is responsible for planting, care, and maintenance of trees on public grounds and rights-of-way. The Springfield-Greene County Parks Department provides tree planting and care on park property. With funding assistance from the MO Dept. of Conservation Tree Resource Improvement and Maintenance (T.R.I.M.) program, Public Grounds conducted a city tree inventory in 2001 that identified the city's tree potential as well as assessing the health, size distribution, diversity, and maintenance needs of existing city trees. This information continues to provide guidance in improving the city's urban forest.

Figure 17 - Quail Creek neighborhood residents and Public Works staff working together to plant trees as part of the Neighborwoods program.

In 2004-2005, 504 trees were planted and 35 trees were removed for a net increase of 469 trees on public grounds, right-of-ways, and parks property. In April 2005, the City received the Tree City USA designation from the National

Arbor Day foundation for the 20th consecutive year as well as receiving the Growth Award for the sixth year in a row. City tree programs include the Neighborwoods volunteer program, Springfield Tree Registry, Tree Planting Permit Program, and Removal Replacement Program. Ozark Greenways also offers the Tree Keepers program that provides training and opportunities for volunteers in proper care of urban community trees. Public Works cosponsors a regional Arbor Day celebration annually.

Parks – Audubon Certification and Sustainable Management

The Springfield-Greene County Parks Department is working to achieve certification for Rivercut Golf Course through the Audubon Cooperative Sanctuary Program for Golf Courses. The program is divided into six key components of environmental stewardship for certification, including a water quality management component. During 2004-2005, the Environmental Planning, Outreach & Education, and Water Conservation components were completed and submitted. It is anticipated that the three remaining components, Water Quality Management, Wildlife & Habitat Management, and Chemical Use Reduction & Safety, will be completed by spring 2006. Certification efforts will also begin on the other municipal golf courses, starting with Horton Smith Golf Course in Fall 2005. Along with these certification efforts, Rivercut and Parks planning staff are working on implementing sustainable management practices at Rivercut as a pilot project to evaluate the potential for using these practices as appropriate at other municipal parks and golf courses.

The Springfield-Greene County Parks Department is working to achieve certification for Rivercut Golf Course through the Audubon Cooperative Sanctuary Program for Golf Courses.

NRCS – South Missouri Water Quality Project Urban Nutrient Management Plans

Since 2003, the South Missouri Water Quality Project has designed lawn fertilization plans for area residents and businesses including Springfield. The South Missouri Water Quality Project is a specialized project office of the United States Department of Agriculture-Natural Resources Conservation Service. Historically, the NRCS has designed nutrient management plans for agricultural operations, specifically for waste management and fertilization application practices. However, with the emphasis on urban non-point sources, proper lawn fertilization based on sound scientific and technical information has become a useful practice in order to deter the impacts urbanized communities can have on water resources.

The urban nutrient management plans designed by the South Missouri Water Quality Project are based on three factors: 1) the size of the lawn, 2) the available fertilizers on the open commercial market and 3) a soil test analysis report of the lawn itself. Based upon these three factors, a prescribed fertilization plan can be designed informing the landowner what type and quantity of fertilizer is required in order to meet optimal soil fertility conditions for their lawn. Most importantly the plan has a calendar explaining when the fertilizer should be applied as well.

In 2003-2004, the South Missouri Water Quality Project designed lawn fertilization plans for 109 residential and commercial properties within the city limits of Springfield totaling 18.01 acres. In 2004-2005, the South Missouri Water Quality Project designed lawn fertilization plans for 44 residential and commercial properties within the city limits of Springfield totaling 11.67 acres. In cooperation with the Storm Water Services Division, the NRCS-South Missouri Water Quality Project continues to address and support storm water initiatives such as the urban lawn nutrient management plans in order to deter water impacts while sustaining the quality of life for residents of Springfield.

The South Missouri Water Quality Project has designed lawn fertilization plans for 153 residential and commercial properties in Springfield totaling almost 30 acres.

Evaluation – Major Findings

- Voluntary efforts by citizens and businesses are an extremely valuable part of a successful storm water management program and should continue to be encouraged through public education and outreach. The Adopt-A-Stream program, providing opportunities for volunteers to help keep waterways in Springfield clean, was met with enthusiastic response by the public when launched in May 2005.

Voluntary efforts by citizens and businesses are an extremely valuable part of a successful storm water management program.

- The industrial facility inspection program developed for Activity 8.b in Section 5.8 proved to be mutually beneficial, providing an opportunity for Storm Water Services staff to become familiar with the site characteristics and operations of each facility while providing facility staff an opportunity for self-assessment based on the indications of the inspection. It also served as an opportunity for outreach in terms of introducing these facilities to the services provided by the Storm Water Services Division and providing points of contact for both parties.

- Mapping of the MS4 has proven to be a valuable tool for illicit discharge investigation, development of the Field Screening Program, watershed planning, and other storm water management activities. The MS4 is estimated to total over 11,000 point features and approximately 500 miles of infrastructure. During year three, it is estimated that 30% of the MS4 was mapped, bringing the total mapped to approximately 53% of the entire system. Statistics on the inventory are included in Appendix B.

Evaluation – Program Strengths

- Many of the goals of the Storm Water Management Program and the Springfield-Greene County Parks Department share common objectives that result in mutually beneficial programs and partnership opportunities. The preservation of riparian corridors and floodplains through the Floodplain Acquisition Program has allowed for the creation of greenway trails, providing opportunities for recreation and connecting existing city parks. Many city parks contain streams and lakes, creating opportunities for Adopt-A-Stream volunteers as well as opportunities for waterway restoration and bank stabilization projects. In Spring 2005, the Heart of the Ozarks Junior Golf Foundation funded improvements to Oscar Blom Golf Course including the drainage channel that runs through the golf course. The eroding channel was re-graded from nearly vertical to 3:1 sides and stabilized with erosion control fabric in the channel bottom and sod on the channel sides as shown in Figure 18.

Many of the goals of the Storm Water Management Program and the Springfield-Greene County Parks Department share common objectives.

Figure 18 - Channel improvements at Oscar Blom Golf Course

Other mutually beneficial programs include the Parks' Outdoor ~ Recreation Initiatives program which coordinates a Stream Team and other activities with a water quality education component. The program will be housed at the future Watershed Center. The Parks Department is also working to achieve Audubon certification for municipal golf courses and as well as the development of sustainable management practices for municipal parks and golf courses such as integrated pest management, the use of native vegetation, and other practices that are beneficial for storm water quality.

- Since 1993, the citizens of Springfield have continued to demonstrate increased public support for implementation of sound storm water management practices. Voters passed initiatives for storm water funding in 1995, 1999, 2001 and 2004. Water quality has become an increasing priority among citizens and civic leaders, as shown in the Vision 20/20 five-year action plan. The Vision 20/20 Water Quality Planning Group is providing goals and objectives for storm water management in the future.

- Since 1993, the City has invested approximately $10.3 million in Floodplain Acquisition Program funds to acquire flood-prone properties as well as undeveloped acreage within sinkholes and along waterways. The preservation of riparian corridors and the adjacent floodplains is basic to meeting the needs and expectations of the community in terms of water quality, flood control, wildlife habitat, greenspace and recreation.

- The City continues to offer a comprehensive education and public outreach program on water quality issues through a variety of components summarized in Section 5.10 of this report. Additional education and outreach components developed during year three include the Adopt-A-Stream program, a stream signage project, and development of a Storm Water Services Division logo, display, and brochures. The City continues to partner with an outstanding network of individuals, agencies, and organizations who provide education and outreach, including Watershed Committee of the Ozarks, James River Basin Partnership, Missouri Dept. of Conservation, Missouri Dept. of Natural Resources, and Natural Resources Conservation Service.

The City continues to partner with an outstanding network of individuals, agencies, and organizations providing education and outreach.

- Since 1995, the City has committed over $16 million to a comprehensive Infiltration and Inflow (I/I) Program. The I/I Program reduces the incidence of sanitary sewer overflows into the storm water system through a proactive Sewer System Evaluation Survey. The Sewer System Evaluation Survey was completed system-wide in June 2003. The City is continuing rehabilitation of the system. In 2004-2005, 3,651 lineal feet of sanitary sewer lines and 728 manholes were rehabilitated. Ten percent of sanitary sewer revenues are earmarked to finance ongoing I/I efforts.

- Southwest Missouri has demonstrated broad based support for protection of water resources due in large part to the strong connection between water resources, the tourism industry and quality of life in the Ozarks. This support is evident in the outstanding network of organizations, agencies, and individuals that contribute to water protection efforts and through coverage of water quality issues by the local media including the *Springfield News-Leader*, TV networks, and other local publications.

Evaluation – Program Weaknesses

In May 2003, Mr. Jonathan Jones, P.E., of Wright Water Engineers, Inc. in Denver, Colorado, provided City Council with an evaluation of Springfield's Storm Water Management Program from a national perspective. While the evaluation ranked the program favorably, it targeted areas for improvement to strengthen the program in the future. In addition to successfully administering and complying with the requirements of the NPDES permit, Mr. Jones' priority recommendations included:

1. Increase permanent funding for system maintenance, staffing, administration and operations. Evaluate and propose a permanent funding source.
2. Initiate targeted watershed planning.
3. Develop a comprehensive drainage criteria manual.
4. Obtain authority to require grading plan in development submittal process.
5. Implement Pearson Creek, South Dry Sac and sinkhole water quality requirements citywide.
6. Enact ordinances regarding adoption of drainage criteria manual and master plan, and provide City authority to require grading permit.
7. Increase public education and involvement, in general.

8. Continue to improve water quality, especially in the James River Basin.
9. Continue to prepare detailed flood hazard maps.
10. Implement pilot projects regarding new storm water and stream channel management practices, such as "low-impact development" and "bioengineering" for stream channel stability.
11. Continue acquisition of flood-prone structures and preservation of riparian corridors.
12. Encourage multi-purpose facilities that are valuable community assets, like the YMCA detention basin, including partnerships to create such facilities.
13. Adopt a more proactive approach to erosion control at construction sites, emphasizing education.

Many of these targeted areas are being addressed within current budgetary and staffing limitations.

1. A 5-year action plan was released in June 2004 for implementation of the Vision 20/20 Comprehensive Plan. The action plan includes conducting a formal funding study for storm water and non-point source pollution programs. In year three, city staff presented funding options and participated in discussions with the water quality funding workgroup formed as a result of this plan.
2. The City continues to lay the groundwork for watershed planning through development of enhanced flood hazard maps, watershed assessments, mapping of the storm water system citywide, and mapping of buffers along waterways. These efforts are discussed in Section 3.0 SWMP Watershed Assessments.
3. Development of a comprehensive storm water drainage criteria manual is currently underway. The City has contracted with consultants to complete the manual in 2006.
4. Consideration of a grading plan requirement will be evaluated based on the schedule contained in the Vision 20/20 5-year action plan.
5. Consistent with the recommendations of the Vision 20/20 Water Quality Planning Group in the 5-year action plan, consideration is being given to expanding the current water quality requirements for the Pearson Creek, South Dry Sac and sinkhole watersheds citywide. This consideration is being addressed in the storm water drainage criteria manual being developed. City staff is currently implementing these requirements citywide on a trial basis prior to permanent implementation through adoption of the criteria manual following a public comment period.
6. Ordinances adopting the drainage criteria manual and master plan and providing City authority to require a grading permit will be considered in accordance with the completion of the manual and based on the schedule contained in the Vision 20/20 5-year action plan.
7. Public education and involvement is continually increasing as the City's Storm Water Management Program expands. Section 5.10 of this report summarizes the City's education efforts.
8. The City, as well as the outstanding network of organizations and agencies in the area, is continually working to improve water quality in the James River Basin. The City's efforts, as well as some of the efforts of these other entities, are detailed in this report.
9. The City is continuing to develop detailed floodplain maps as well as flood hazard maps for areas beyond the designated FEMA boundaries. These efforts are discussed in Section 3.0 Flood Hazard Mapping.
10. As detailed above in Section 3.0:
    a. The City is providing technical assistance on a low impact development (LID) design by Greene County for a Habitat for Humanity subdivision.
    b. A creek daylighting project was completed using bioengineering concepts on Jordan Creek North Branch during year three.
    c. Channel improvements utilizing bioengineering design are planned for Fassnight Creek.
    d. The Ward Branch box culvert at Weaver Road was designed to limit stream impacts and provide for riparian corridor revegetation.
11. The City continues to acquire flood-prone properties and undeveloped acreage within sinkhole boundaries and along riparian corridors as summarized in Section 3.0 Floodplain Acquisition Program.
12. The City continues to explore opportunities to create multi-purpose facilities. Storm water improvement projects completed in year three are discussed in Section 3.0 Capital Improvements Program.

13. The City is working to adopt a more proactive approach to erosion and sediment control at construction sites. In January 2005, City personnel gave presentations on erosion and sediment control at seminars during the Construction Specification Institute Southwest Missouri Chapter trade show.

Evaluation – Future Direction of the SWMP

The following activity is scheduled for implementation in year four, as required in Part III.A of the Permit. The implementation of this activity is in addition to ongoing activities implemented as required in the first three years.

- Review current street design, construction, and maintenance requirements in environmentally sensitive areas, such as those adjacent to streams, wetlands, and floodplains, and incorporate BMPs to the Maximum Extent Practicable

Activities implemented as required in the first three years are ongoing throughout the permit period. These activities undergo further development as needed and based on available staff and funding resources. Additional activities are planned for year four that are considered important to the SWMP but are beyond the scope of the Permit. These activities are contingent upon available resources.

- It is anticipated that a network of rain gauges will be installed to supplement precipitation data from the National Weather Service at the Springfield-Branson Regional Airport. The additional data will aid in determining qualifying rain events for wet-weather sampling and will enhance the accuracy of estimates for the wet-weather sampling discharge volume and for the total annual volume of urban runoff discharges. The data will also be useful for watershed modeling and planning.
- Revision of the City's storm water drainage criteria manual will continue with expected completion in 2006. The process is being implemented in conjunction with the recommendations from the Vision 20/20 Water Quality Planning Group.
- Preparation will continue on a city flood hazard atlas to aid in identifying flood-prone areas for the Floodplain Acquisition Program.
- Watershed assessments will continue on a priority basis.
- Mapping of buffer areas along streams will continue and consideration will be given to implementing stream protection buffers in new developments as part of the storm water drainage criteria manual currently being developed.

4.0 SWMP Summary Table

The SWMP Summary Table on the following page has been prepared according to the format outlined in Part V.D.2.c. of the Permit. The table documents program activities that are quantifiable. Some activities could not be quantified and therefore do not appear in the summary table but are discussed in Section 5.0 Narrative Report.

Table 1 - Storm Water Management Program Summary Table

Task	Required Schedule	Schedule Adhered?	Activities Accomplished	Available Documentation & Comments
MS4 Inventory	Existing schedule (1 FTE)	Yes	Estimated 30% mapped, bringing total to 53% of system	Section 5.1, Activity1.a; Appendix B
Inspections of MS4 quality control structures	Periodic	Yes	23 city-owned basins inspected in April	Section 5.1, Activity 1.b
Floatables removal (grate inlets, waterways, bridge, and sinkhole routes)	Existing schedule (As needed)	Yes	30,636 locations cleaned (including locations cleaned more than once	Section 5.1, Activity 1.c
Cleaning roadway inlets and catch basins	Existing schedule (As needed)	Yes	Catch basin cleaned biannually; Cleaning of roadway inlets not tracked separately	Section 5.3, Activity 3.d
Street Cleaning	Existing schedule (weekly/bimonthly)	Yes	1,211 tons of sweepings and 1852 cubic yards of leaves collected	Section 5.3, Activity 3.b
Dry-weather field screening	50 points/year	Yes	50	Field Data Sheets; Section 5.7, Activity 7.b
Wet-weather field screening	25 points/year	No	24	Below average rainfall limited sampling opportunities. See Section 5.7, Activity 7.b
Illicit Discharge/pollution report investigations	As needed	Yes	29	Section 5.7, Activity 7.d
Infiltration and Inflow Program	N/A	N/A	3651 lineal feet of sanitary sewer lines and 728 manholes rehabilitated	Quarterly reports to MDNR; Section 5.7, Activity 7.g
Representative Monitoring (Stream Sampling)	6 sites 4 times/ year	Yes	6 sites 4 times/year	Section 6.3, Table 9.
Education	N/A	N/A	1 City Utilities bill insert distributed to 98,000 customers; 50 storm drain markers 1 water education festival 31 presentations 11 displays 6 workshops/seminars 11 tours	See Section 5.10 for full summary of activities
Tree Planting	N/A	N/A	469 trees (504 planted and 35 removed) on public grounds, right-of-ways, and parks	Section 3.0 City Tree Programs

5.0 Narrative Report

The purpose of this section of the report is to discuss those SWMP elements required for development under Parts II and III of the Permit. The activities for each element are identified with their corresponding number and letter listed in Part II.A of the Permit.

5.1 – Operation and Maintenance of Structural Controls

Activity: *1.a - Continue to update and maintain the inventory data for the MS4 within the City boundaries.*

The City currently has one full-time position assigned to inventory and map the MS4. The inventory data includes seven major components in two categories:

- Linear Features
  1. Pipe
  2. Box Culvert
  3. Channel
- Point Features
  4. Inlet
  5. Junction Box
  6. Detention Basin
  7. Bridges

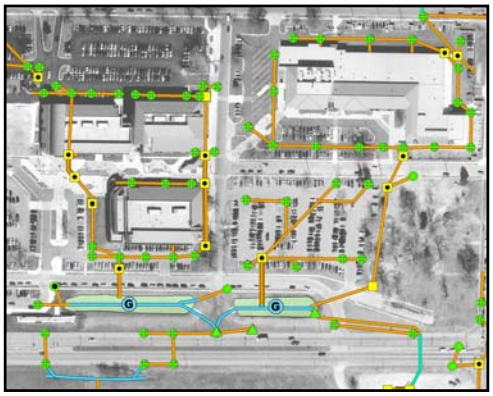


Figure 19 - GIS mapping of the MS4

These point and linear features are identified through the use of construction plans and aerial photography, as well as field verification and other documentation available. These features are digitized with the use of GIS software. Information about these structures is recorded in a corresponding database. This data aids in investigation of spills and illicit discharges in addition to being a useful tool for maintenance activities and watershed planning. During year three, approximately 30% of the MS4 was mapped, bringing the total mapped to an estimated 53% of the entire system. Statistics on the inventory are included in Appendix B. Sinkholes within the City have also been mapped with the use of GIS software and represent an eighth feature type in the MS4. The *Springfield Area Watersheds and Sinkholes* map is included in Appendix A.

Activity: *1.b - Develop and implement a program for periodic inspections of the storm water quality control structures.*

A program for inspections of storm water quality control structures was developed and implemented in year two and continued in year three. Structures included in this program are city-owned detention basins and catch basins. The City currently owns and maintains 22 detention basins and one catch basin. The basins were inspected in April 2005 to identify maintenance needs. Basins were inspected for structural condition, vegetation condition, and the presence of trash, debris, and deposits. Table 2 shows the inspection results and maintenance completed on each basin. The inspections will be conducted on an annual basis.

Table 2 – Detention Basin Inspection Results

Basin #	Location	Structural Condition	Vegetation Condition	Trash/debris/deposits	Maintenance Completed
1	2200 block S Kansas Expy	Good	Good	Sediment at weir	Removed sediment
2	NE corner National/Sunshine	Good	Good	None	None
3	1400 block S Weller	Good	Good	None	None
4	SW corner Billings/Westgate	Good	Good	Trash; Sediment in channel	Removed trash and sediment
5	2500 W Chestnut Expy	Good	Good	Sediment at weir	Removed sediment
6	2100 block W Melville Rd	Good	Good	None	None
7	2100 block N Alliance	Good	Good	Sediment in channel	Removed sediment
8	1900 block N Alliance	Good	Good	Sediment in channel and at weir	Removed sediment
9	400 block N Cedarbrook	Good	Some sparse areas	Sediment at weir	Removed sediment
10	2100 block E Pythian	Good	Good	None	None
11	2000 block E Pythian	Good	Good	None	None
12	2700 block E Blaine	Good	Good	None	None
13	2600 block N LeCompte	Good	N/a (wet basin)	None	None
14	4300 block E Mustard Way	Good	Good	None	None
15	2300 block S Blackman	Good	Good	None	None
16	SE corner Meador Park	Good	Good	Sediment at weir	Removed sediment
17	SW corner Carleton/Bothwell	Good	Good	Sediment/gravel at weir	Removed sediment/gravel
18	2000 block E Republic	Good	Good	None	None
19	1900 block S Linden	Riser pipe outlet clogged	Poor – very little grass	Sediment in channel	Outlet unclogged and holes widened; weir installed in channel to catch sediment; sediment removed; Reseeded
20	NW corner Kimbrough/Walnut Lawn	Good	Good	Sediment and yardwaste at weir	Removed sediment and yardwaste
21	1451 E Primrose	Good	Some sparse areas	Sediment at weir	Removed sediment
22	SE corner Lakewood/Ash	Good	Good	Pipe discharge clogged w/ sediment	Removed sediment
23	SE corner Arlington/LaMonta	Good	N/A (concrete catch basin	None	None

Activity: *1.c - Continue existing maintenance program by periodic collection and removal of floatables from the MS4 to the Maximum Extent Practicable (MEP).*

The Bridge & Waterways Section of Public Works routinely checks and removes debris from the MS4 after rain events. This scheduled maintenance activity consists of four route types:

- Bridge route with 10 priority locations
- Sinkhole route with 12 priority locations
- Waterway routes, north and south, with 85 priority locations
- 12 grate routes with over 1700 priority locations

The Bridge & Waterways Section of Public Works removed debris at 30,636 locations in the MS4 during year three.

Maps of these routes were included in the first and second annual reports. During year three, debris was removed at 30,636 locations (this number includes duplicate locations cleaned more than once). The two monitoring locations designated for the removal of floatable materials as required in Part V.B. of the Permit are reported in Section 6.4 of this report.

5.2 – Control of Discharge from Areas of New Development and Significant Redevelopment

Activity: *2.a - Consideration of incorporating Best Management Practices into land development and management activities of the entire area served by the City's MS4.*

In April 1999, City Council passed Resolution #8648 adopting a Water Quality Protection Policy for the Fulbright Spring, Pearson Creek, and sinkhole watersheds. The Policy, which was adopted in accordance with the short-term recommendations of the Water Resources Task Force and the 1995 Fulbright Spring Protection Study, recognizes the sensitivity of these watersheds. The Fulbright Spring and Pearson Creek watersheds are valuable sources for the community's drinking water supply while sinkholes are a direct connection to the shallow groundwater system that supports springs in the area. The requirements of the Policy apply to all new developments in these sensitive watersheds, shown on the *Springfield Area Watersheds and Sinkholes* map included in Appendix A. The Policy outlines requirements and design criteria for structural BMPs based on the following general design guidelines:

Figure 20 - Grass swale and water quality detention basin

- Minimize runoff by reducing the amount of directly connected impervious area
- Maximize contact with grass by directing runoff over vegetative filter strips and grass swales
- Maximize detention and settling time
- Design for small, frequent storms
- Utilize BMPs in series where possible
- Incorporate both flood control and storm water quality objectives in designs, where practical

Figure 21 - Gravel filter and perforated riser pipe maximize detention and settling time for sediment and other pollutants

The recommendations of the Water Quality Planning Group in the 2004 Vision 20/20 Strategic Plan for Springfield and Greene County include expanding the requirement for water quality BMPs for new developments to include all watersheds in the City. This recommendation is being addressed through the storm water

drainage criteria manual that is being developed, with expected completion in 2006. City staff is currently implementing these requirements citywide on a trial basis prior to permanent implementation through adoption of the drainage criteria manual following a public comment period.

5.3 – Roadways

Activity: 3.a - Review current deicing practices, implementing changes where feasible to minimize the discharge of pollutants to the MS4.

The City's current deicing practices emphasize providing safe driving conditions on municipal streets while also minimizing the potential for deicing materials to discharge into the MS4. The Street Maintenance Division uses rock salt, liquid salt brine and liquid calcium chloride for deicing the City's streets. To prevent contact with storm water, salt is stored in the City's salt dome located in center city as well as in a second storage facility constructed in year two in southwest Springfield. This joint use facility provides ample salt storage, eliminating previous storage on a tarp-covered pad, and more efficient operations for both the City and Greene County

To prevent contact with storm water, salt is stored in the City's two salt storage facilities.

In 1997, the Street Maintenance Division began researching and experimenting with different application rates for deicing materials. Prior to this time, the Division was using the nationally recommended rate of 500 pounds of rock salt per lane mile. It was determined that an effective level of ice and snow removal for public safety could be provided using a reduced rate of 200 pounds per lane mile. The following practices used by the Division help to provide an effective level of ice and snow removal while minimizing the discharge of salt and calcium chloride to the MS4.

Figure 22 - City salt dome at the Public Works Service Center

- Liquid calcium chloride and liquid salt brine are used to pre-wet the rock salt before it is sent to the spreader. Adding liquid calcium chloride or salt brine to rock salt helps shorten the reaction time of the rock salt and provides melting action at lower temperatures. Pre-wetting the rock salt also decreases the salt "bounce off" effect when the salt hits the road, thereby keeping more salt on the roadway and out of roadside ditches. Salt brine is used to pre-wet the rock salt until the temperature drops to 24°F, below which salt brine is not effective and calcium chloride is used.

- When the temperature is high enough that precipitation will start as rain before turning to snow, the Division waits until the snow occurs to apply rock salt to the roadway. If rock salt is applied before the rain turns to snow, the rock salt may get washed into the storm water system.

Activity: *3.b - Continue existing street sweeping program*

The Street Maintenance Division sweeps and cleans all curbed streets in the City on a rotating schedule. During 2004-2005, an additional street sweeper position was added and the routes were reorganized in order to increase the frequency at which the collector and residential street routes are cleaned. Previously, these routes were cleaned every 8 weeks. They are now cleaned every 6 weeks during peak leaf season and every 4 weeks otherwise. During peak leaf season, the street sweepers also clean out ditches along the routes. Arterial roads continue to be swept weekly. The 986 curb miles that are cleaned were reorganized into 66 collector and residential street routes and 9 arterial street routes. During an average eight-hour shift, a sweeper can clean approximately 10 to 15 curb miles depending on conditions such as peak leaf season. The street sweeping schedule is accomplished with nine full-time street sweeping

positions. During year three, the City's street sweepers collected 1,211 tons of street sweepings and 1852 cubic yards of leaves, which were taken to the City's Yardwaste Recycling Center. In addition, the Division routinely picks up debris such as tires, couches, appliances, and bags of trash that are left on the City's right-of-ways, as well as providing cleanup in response to spills, accidents and special events such as parades. The Missouri Department of Transportation (MoDOT) sweeps and cleans state-maintained thoroughfares within the city limits.

The City's street sweepers collected 1,211 tons of street sweepings and 1852 cubic yards of leaves in 2004-2005.

Activity: *3.d - Continue routine cleaning of grated inlets, roadway storm water inlets, and catch basins.*

The Bridge and Waterways Section of Public Works administers an established program of cleaning the storm water conveyance system after rain events. This program includes 12 grate routes covering over 1700 storm grates. The grate route work orders include instructions to clean all pipes and inlets along the route. Maps showing the locations of these routes were included in the first and second annual reports.

The U.S. Environmental Protection Agency defines catch basins as "…chambers or sumps, usually built at the curb line, which allow surface water runoff to enter the storm water conveyance system. Many catch basins have a low area below the invert of the outlet pipe intended to retain coarse sediment" (US EPA 1999). There is one catch basin in the City that has the defining characteristic of a low area below the flow line meant to retain sediment and debris. This catch basin, located above the upper lake in Southern Hills neighborhood, is cleaned twice per year. The City's sub-inlet chambers generally do not collect debris because the bottoms of the chambers are at the same elevation as the flow line. In some cases, debris can accumulate if the pipe outlet becomes clogged. These chambers are cleaned on an as-needed basis.

5.4 – Flood Control Projects

Activity: *4.a – Continue to assess the impacts on the water quality of receiving waters from flood management projects using procedures and criteria established for storm water grant applications.*

The City continues to consider water quality protection in the design of flood control projects. The criteria from *10 CSR 20-4.061 Storm Water Grant and Loan Program* are used for guidance on storm water improvement projects and must be addressed on applications for state funding for projects. In addition, the storm water drainage criteria manual currently being developed contains a Water Quality chapter drafted during year three that will assist with storm water quality design.

Activity: *4.b – Evaluate existing major flood control facilities for retrofitting with storm water quality controls*

Major city-owned flood control facilities have been identified and are being evaluated for retrofitting as staff resources allow. Major privately owned facilities will also be considered. Evaluation includes:

- Identifying which structures could be enhanced by retrofitting with storm water quality features
- Determining the feasibility of retrofitting based upon considerations of type, location, watershed, ownership, benefits, and cost
- Developing a schedule for retrofitting any structure determined to be appropriate
- Identifying sources of funding for retrofitting structures determined to be appropriate

5.5 – Program to Monitor Pollutants in Runoff from Municipal Waste Management Facilities that are not Permitted by a Separate Permit

Activity: *5.a – The City will continue to study its municipal waste management facilities and determine if additional BMPs are needed to control pollutants to the MS4 and, if so, develop a schedule for implementation.*

As reported under **Activity** *5.b*, there are no active municipal waste management facilities within the City limits. Previous municipal waste management sites are discussed in **Activity** *5.b.*

Activity: *5.b - Establish, as part of the field screening program, a monitoring and inspection program for municipal waste management facilities.*

There are no active municipal waste management facilities within the City limits. As reported in Part I of the application for this Permit, there are four closed landfills within the City limits as well as two fill areas that received demolition debris and possibly some municipal waste. These sites were in operation at various times from the 1910's through the mid 1960's. There are also three sites where the City's early wastewater treatment plants were located. Two of these sites are at the same approximate location as two of the closed landfills. The locations are described below.

1. The Talmage Street City Dump was located at the NW corner of Talmage Street and Benton Avenue. This area drains to field screening point #163 which was sampled on 12/6/04.
2. The Eastgate Landfill was a privately owned site located at the NE corner of Catalpa Street and Eastgate Avenue. This area drains to field screening point #27.
3. The Loren Street City Dump and the Catalpa Street Treatment Plant were both located on the north side of the 2100 block of W. Catalpa Street. This area is adjacent to Jordan Creek approximately 1500 ft. upstream from Bennett Street at which Jordan Creek is monitored as part of the Representative Monitoring Program.
4. The Bennett Street City Dump and the Wilsons Creek Treatment Plant were both located at the SE corner of Bennett Street and Scenic Avenue which is now Jim Ewing Park. This area is adjacent to Wilsons Creek approximately 2.5 miles upstream from Farm Road 146 at which Wilsons Creek is monitored as part of the Representative Monitoring Program.
5. The Walnut Street Landfill was located at the NW corner of Walnut Street and Fort Avenue. This area is adjacent to Jordan Creek approximately 1.5 miles upstream from Bennett Street at which Jordan Creek is monitored as part of the Representative Monitoring Program.
6. The National Avenue Landfill was located at the NW corner of National and Trafficway and is an old quarry site that was used for clean fill only (construction materials and concrete). No storm water discharges from this site.
7. The Pea Ridge Creek Treatment Plant was located north of Doling Park. This area drains to field screening point #163 which was sampled on 12/6/04.

5.6 – Use of Pesticides, Herbicides, and Fertilizers (PHFs)

Activity: *6.a - Continuation of public education program to promote the proper use, handling, storage, and disposal of PHFs through the Integrated Solid Waste Management System.*

The Solid Waste Management and Storm Water Services Divisions of Public Works provide the public with educational information on the proper use, handling, storage, and disposal of pesticides, herbicides, and fertilizers (PHFs). Information about the Show-Me Yards & Neighborhoods (SMY&N) Program and the Household Chemical Collection Center (HCCC) is featured at education and outreach opportunities as summarized in Section 5.10 of this report, including community events such as the Home Show and Lawn & Garden Show with average attendance numbers of 17,000 and 14,000 respectively. Both the SMY&N Program and the HCCC were also highlighted on the *Quality Ozark Streams* flyer included in City Utilities bills distributed to approximately 98,000 customers in October 2002, 2003, and

2004. This flyer is included in Appendix C. In addition, SMY&N information is provided along with the Urban Nutrient Management Plans prepared by the NRCS South Missouri Water Quality Project as described in Section 3.0.

- SMY&N education and outreach activities are designed to raise awareness of the significant role lawns play in the total amounts of nutrients and pollutants in storm water runoff flowing to area waterways. SMY&N offers environmentally responsible lawn and landscaping tips, including proper use of PHFs. Individuals and professionals who put the SMY&N techniques into practice are recognized and commended – homeowners can earn an attractive yard sign and professionals can become certified. Professionals have been particularly responsive to the program, with 65 professionals receiving certification to date. Professionals receive periodic mailings that provide tips, reminders, and other information.

Figure 23 - SMY&N sign in a certified yard in Springfield

The SMY&N Phase II 319 mini-grant from the Missouri Department of Natural Resources was completed in December 2003. The program continues with funding and support from Public Works, the Watershed Committee of the Ozarks, and the James River Basin Partnership. SMY&N will be a component of the education program at the new Watershed Center for which plans are underway as discussed in Section 3.0. SMY&N produces and distributes two booklets – *Cool Season Grasses Lawn Care & Maintenance Calendar* and a general information booklet referred to as *Take Home Tips* that were developed in December 2003 and were included in the second annual report. These booklets, a list of certified professionals, and other program information are available on the SMY&N webpage at www.springfieldmogov.org/showmeyards.

- The HCCC is available to Springfield and Greene County residents for proper disposal of unneeded household chemicals, including PHFs. The Solid Waste Management Division produces and distributes a brochure that provides information about visiting the HCCC and guidelines on proper storage and handling of household chemicals. This information is also available on the Division's web page at www.springfieldmogov.org/recycling. In 2004-2005, 102,533 lbs. of household materials were collected at the HCCC. Of this total, 83% or 85,247 lbs. were recycled. A 10-year comparison showing a breakdown of the types of materials collected and recycled is included in Appendix B. Tours of the HCCC are given to school classes and other interested groups, as listed in Section 5.10.

Activity: *6.b - Review municipal usage of PHFs on public properties and rights-of-ways to determine the effectiveness and feasibility of using alternatives to PHFs*

The Public Grounds Division of Public Works and the Springfield-Greene County Parks Department require that all pesticides, herbicides, and fertilizers (PHFs) be applied under the direct supervision of a Missouri licensed certified public operator as required by state law.

The Public Grounds Division uses herbicides to minimize species that require frequent mowing, particularly on street medians. Fertilizers are typically used only to promote reseeded areas and as part of the lawn care program designed for the Government Plaza. In these instances, a low-nitrogen, low-phosphorous product that focuses on promoting root growth is used. The Division's Grounds Maintenance Crew Leader has completed the Show-Me Yards & Neighborhoods Lawn Care Professionals Certification Program in commitment to environmentally sound lawn care practices, including minimum usage of PHFs.

The Springfield-Greene County Parks Department uses PHFs to maintain City parks according to the usage of the property. Sports fields and golf courses are fertilized to provide an optimal surface for sports activities and to compensate for the physical wear to the grass cover. A pre-emergent herbicide is used on these properties to minimize species that can require more frequent mowing. Pesticides are only used on city parks, golf courses, and sports fields if a persistent pest problem occurs. Usage is limited to the affected area only. The Parks Department does not use any

pesticides that are registered with the Missouri Department of Agriculture as Restricted-Use Pesticides. Several Parks Department personnel have also completed the Show-Me Yards & Neighborhoods Lawn Care Professionals Certification Program.

Further study would be needed to determine the feasibility of using alternatives to PHFs to effectively serve the purposes of minimizing maintenance activities and providing optimal conditions for the community's sports activities.

In 2004-2005, the Parks Dept. began the process to certify Rivercut Golf Course through the Audubon Cooperative Sanctuary Program for Golf Courses. One of the components of this certification is Chemical Use Reduction and Safety, which includes specific requirements for implementing Integrated Pest Management (IPM) and other techniques for reducing the use of PHF's. It is anticipated that the certification process for Rivercut will be completed in Spring 2006. Certification efforts will also begin on the other municipal golf courses, starting with Horton Smith Golf Course in Fall 2005. Along with these certification efforts, staff is evaluating municipal parks for implementation of sustainable management practices including IPM, use of native vegetation, no mow zones, and others.

5.7 – Illicit Discharges and Improper Disposal

Activity: *7.a – The City will develop standard procedures for investigation of reports of illicit discharges and for enforcement to prevent such discharges.*

The Storm Water Services Division conducts investigation of illicit discharges and enforcement to prevent such discharges. Investigation is conducted in cooperation with the City's Sanitary Services Division or the Missouri Department of Natural Resources when necessary. The assistance of the Emergency Spill Response Team of the Springfield Fire Department is also utilized when necessary for hazardous materials spill response.

The Storm Water Services Division conducts investigation of illicit discharges and enforcement to prevent such discharges.

Illicit discharges may be identified through dry-weather screening or wet-weather monitoring activities of the field screening program, or through other water quality monitoring, public reporting, or responsible party reporting. Illicit discharges may be direct or indirect connections and can occur as either intermittent or continuous flows. Examples of illicit discharges include dumping of motor oil, discharges of un-permitted wash waters, process material spills, and illicit connections. Standard procedures for investigation of illicit discharges include the following steps:

1. Substance Identification
2. Source Identification
3. Notification of Responsible Party
4. Abatement
5. Documentation

1. Substance Identification
If the source of a discharge is not known, substance identification can be conducted to aid in source identification. Substance identification of the discharge should begin with assessment of physical properties including color, odor, clarity and sheen. Physical properties may provide sufficient indication of the substance. If physical properties do not provide a clear indication of the nature of the discharge, colorimetric field test kits can be used to determine the presence of chlorine, copper, phenol, and detergents, as conducted for the dry-weather screening component of the Field Screening Program outlined in Part II.A.7.b of the Permit. Temperature, dissolved oxygen, pH, and conductivity readings can be measured using hand-held meters. If necessary to aid in enforcement procedures, a grab sample may be collected and analyzed for the pollutants listed in Part II.A.7.b of the Permit or other pollutants if appropriate.

2. Source Identification
Procedures used for source identification depend on the nature of the illicit discharge. Procedures are outlined for:

- Dumping of pollutants in streets, ditches or other areas of the storm water drainage system
- Continuous or intermittent flows during dry-weather conditions
- Illicit discharges or pollutant sources indicated by wet-weather sampling results

Dumping
In the case of dumping of pollutants in the storm water drainage system, three scenarios are most likely regarding identification of the responsible party.

- Responsible party is untraceable
- Responsible party was indicated by the reporting entity
- Responsible party is suspected but cannot be verified

If the responsible party is untraceable, cleanup procedures are detailed under Abatement/Enforcement. If appropriate, an informational notice about illegal dumping may be sent to surrounding businesses and residents.

If the reporting entity identified a responsible party, either a business or resident, then a site visit will be conducted if applicable to verify the identity of the responsible party. If identification of the responsible party can be verified, through admittance by the responsible party, evidence identified through a site visit such as possession/use of materials dumped, or other legally defensible means, then a request that the responsible party conduct cleanup will be made.

If the identification of the responsible party is suspected but cannot be verified, information concerning the proper handling and disposal of the dumped material(s) will be provided to the individuals and/or entities in the area that handle the dumped material. This information will include references to City ordinances prohibiting dumping and illicit discharges, and educational information concerning water quality. This information is provided to raise awareness as a means to preventing future illicit discharges. Depending on the situation, this information may be provided through discussions during a site visit or by letter in the format of an informational notice. A letter may be sent to all surrounding residents or similar businesses in the area to improve the odds of providing this information to the responsible party.

Dry-Weather Discharges
In the case of an illicit discharge that is a continuous or intermittent flow observed in the storm water system during dry weather conditions, source identification will include tracing the flow upstream in the system. A map of the drainage basin with aerial photography will be generated showing the mapped areas of the storm water system, 2-ft contour lines, city water and sewer lines, NPDES permitted facilities, and SIC codes of businesses. Starting at the outfall where the illicit discharge daylights, a systematic investigation of the upstream system will be performed. Each manhole or grate inlet access to the system will be checked to verify the existence of the flow in question. This systematic investigation will be conducted upstream to the point of identification of the source or to the point where the flow ceases between two manholes or grate inlets. In this case, in-system investigation may be necessary to determine the point at which the flow is entering the system, such as an illicit connection or crack in the system. Once the source has been identified, the procedures for Notification of Responsible Party, Abatement/Enforcement, and Documentation will then be implemented.

Wet-Weather Discharges
In the case of an illicit discharge or pollutant source that is indicated through wet-weather sampling, source identification will be performed as follows.

- A map of the drainage basin with aerial photography will be generated showing the mapped areas of the storm water system, 2-ft contour lines, city water and sewer lines, NPDES permitted facilities, and SIC codes of businesses.

- SIC code information will be considered to identify facilities that may not be required to have an NPDES permit or have filed for exemption from permitting but may have a potential for contributing pollutants to storm water runoff.
- An initial assessment of the drainage area using this map will be conducted to identify potential sources of the pollutant(s). Once potential sources have been noted, these sources will be investigated through site visits to identify conditions or activities that could be the source of the pollutant(s).
- If a condition or activity is observed during this investigation that constitutes a pollutant source, the procedures for Notification of Responsible Party, Abatement/Enforcement, and Documentation will then be implemented.
- If no condition or activity is observed that appears to be the source of the pollutant(s), then additional wet-weather sampling will be conducted in an attempt to isolate the source of the pollutant. Locations for additional wet-weather sampling will be chosen depending on the situation. A sampling point may be chosen upstream from the point where a pipe or box discharges to the system in an attempt to eliminate that outfall. If an industrial facility or other location is suspected to be the source but cannot be verified as such through site visits, a point which drains only this location may be chosen for additional sampling to verify or eliminate this location as the source.
- If additional sampling results in isolation of the source, the procedures for Notification of Responsible Party, Abatement/Enforcement, and Documentation will then be implemented.

3. Notification of Responsible Party
If an illicit discharge is traced upstream to a known source or the party responsible for dumping is verified, the responsible party will be notified by site visit and/or written notification.

4. Abatement/Enforcement
Similar to source identification procedures, the actions taken to abate the illicit discharge depend on the nature of the discharge.

Spills or Illegal Dumping
In the case of a spill or dumping, if the responsible party is known, a request will be made to the responsible party to conduct cleanup of the spilled or dumped materials. The responsible party may conduct cleanup if appropriate materials and equipment are on-hand, or they may retain environmental services to conduct the cleanup. Cleanup typically involves containing the material if needed and utilizing absorbent materials and/or a vacuum truck to remove the material. Absorbent materials should be properly disposed of. Material removed by a vacuum truck should be hauled to the City's wastewater treatment plant or disposed of in an on-site sanitary sewer drain if prior approval to do so has been obtained from the City's Sanitary Services Division.

Discharges or Polluting Activities
If the illicit discharge is a dry-weather discharge or pollutant source indicated by wet-weather sampling results, the responsible party will be notified to discontinue the discharge or polluting activity. Depending on the cause of the discharge or the nature of the polluting activity, immediate compliance with this request may be appropriate, such as if the discharge is from washing activities. If the discharge is due to an infrastructure maintenance need on the property of the responsible party, then the request for abatement of the discharge will be formalized in writing with a time period, usually 30 days, given to comply with the abatement request. If the responsible party does not comply with this written request, if the activity or discharge has previously occurred, or due to the severity of the circumstances, official enforcement actions authorized in City Code Section 96-53 and listed below will be taken. Violators are subject to penalties as set forth in City Code Section 96-34.

- Notice of Violations
- Consent Orders
- Show Cause Hearings
- Compliance Orders
- Cease and Desist Orders

- Notice to Clean and Abate
- Mitigation
- Storm Water Pollution Prevention Plan
- Violations Deemed a Public Nuisance
- Costs of Enforcement

Unknown Responsible Party
If dumping or other discharges occur for which the responsible party cannot be determined, Public Works will conduct cleanup when possible. The City's Emergency Spill Response Team will be contacted to assist when necessary in spill containment and neutralization. The Missouri Department of Natural Resources will be notified if the discharge is to waters of the state or is of a nature that requires the assistance of the MDNR Emergency Response Team.

5. Documentation
All illicit discharge investigations are documented in the City's Illicit Discharge database maintained by the Storm Water Services Division. If needed, an illicit discharge report is also drafted to contain additional details and is referenced in the database entry. Digital pictures are taken during illicit discharge investigations when possible and referenced in the database entry. The database entries for each permit year are reported in the annual report.

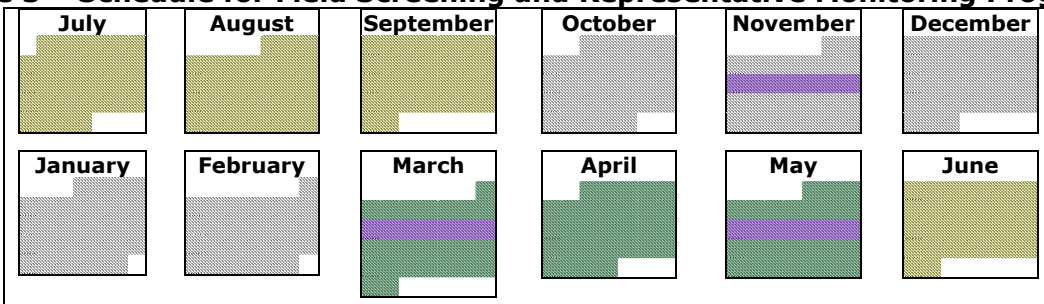
Activity: *7.b - Development and implementation of a Field Screening Program.*

The Field Screening Program at in-system locations and the Representative Monitoring Program at in-stream locations comprise a two-fold approach for monitoring the MS4. Table 3 illustrates the calendar schedule specified in the Permit for these two programs. The Representative Monitoring Program is discussed in Section 6.3 of this report. The Field Screening Program involves dry-weather and wet-weather screening.

- **Dry-weather screening** serves to identify illicit discharges to the MS4. If flows are present at screening locations during dry weather, field kits are used to test for chlorine, copper, phenol, and detergents. Further investigation is done to isolate the source of the discharge and, according to the field testing results, to isolate the source of the pollutant. Screening is required at a minimum of 50 locations each permit year.
- **Wet-weather screening** serves to quantify the quality of storm water from industrial areas to the MS4. Screening points that drain industrial areas are sampled following rain events that meet criteria specified in the Permit. The samples are sent to the City's Wastewater Laboratory for analysis. Sampling at 25 points each year is required.

Program Development
The method of establishing the required 250 field screening locations involved the utilization of MS4 inventory data along with sub-basin watershed configurations developed by the Storm Water Services Division. This is a practical and realistic methodology to approximate the density and distribution of screening locations that would be established using the grid cells methodology specified in Section II.A.7.b of the Permit. The sub-basin watersheds range in size from 0.01 square miles to 0.3 square miles, comparable to the specified size for grid cells. A GIS database has been created to contain the geographic and land use properties of each location and the results of screening.

Table 3 – Schedule for Field Screening and Representative Monitoring Programs



Sampling or Monitoring Event	Comments
Ambient sampling at 6 in-stream locations	32 parameters – Second weeks in March, May, November
Wet weather sampling at 6 in-stream locations	32 parameters – Once between March 1-May 31 Sampled no later than 48 hours after at least 0.2" and <3" during a 24-hour period preceded by at least 72 hours with no precipitation >0.1"
Dry weather screening at 50 drainage points (5% residential)	If flow present, 4 parameters in field – Between June 1-October 1
Wet weather sampling at 25 industrial drainage points	18 parameters – Anytime throughout the year Sampled no later than 48 hours after at least 0.2" and <3" during a 24-hour period preceded by at least 72 hours with no precipitation >0.1"

Program Status – Dry-Weather Screening

Dry-weather screening was completed at 25 points in year one, 75 points in year two, and 50 points in year three to achieve the program schedule for the first three years of the Permit. A list and maps of the 250 screening locations, showing the screening status of each location, are included in Appendix A. Of the 50 points screened in year three, 5 had flow. Table 4 shows the field testing results for the discharges at these points. The flows at sites 2, 68, and 138 were traced to industries that have NPDES permits for discharging non-contact cooling water. Tracking of the flow at sites 50 and 76 was inconclusive and will be continued.

In year three, the six sites that had flow when screened during year two were screened again. Sites 42, 80, and 233 did not have flow when re-screened. Sites 60, 61 and 101 did have flow when re-screened. Sites 60 and 101 were tracked upstream in the MS4 to private facilities. City staff is working with these facilities to verify preliminary indications that the source of the flows is drainage of condensation from air handlers and ground water from basement and tunnel sump pumps. Site 61 was tracked and verified as groundwater that is pumped from a French drain installed for a nearby parking lot.

Table 4 – Dry-Weather Screening Results

Site #	Date	Chlorine (mg/l)	Copper (mg/l)	Detergents (mg/l)	Phenol (mg/l)	Temp (°F)	pH	DO (mg/l)	Conductivity (us)	Settleable Solids (mg/l)
2	6/27/05	0.3	0	0	0	77	7.1	5.06	287	0
50	6/23/05	0.4	0	0	0	83	7.3	3.34	677	0
68	6/23/05	0.4	0	0	0	86	7.0	4.39	293	0
76	6/23/05	0.4	0	0	0	77	6.95	4.5	408	0
138	6/23/05	0	0	3	0	90	7.0	1.84	845	0

Program Status – Wet-Weather Screening

Wet-weather screening was completed at 24 points in year three. Less than average rainfall resulted in limited opportunities for sampling. Because wet-weather screening was implemented in year two and sampling opportunities were limited in year three, additional sampling beyond the annual requirement of 25 points will be conducted in the remaining permit years to achieve the program schedule of 125 points over the life of the permit.

Samples were analyzed at the City's Wastewater Laboratory at the Southwest Wastewater Treatment Plant. The wet-weather screening results are shown in Table 5. Three of the samples, sites 106, 134, and 253 in particular exhibit higher pollutant levels when compared to the remaining results. Site 106 was also sampled in the second permit year. Because of the high pollutant levels, it was resampled in the third year, with the results being similar. This facility was included in the inspection program detailed in Section 5.8 Activity 8.b to identify areas for improvement. The facility had previously implemented a number of BMPs detailed in their Storm Water Pollution Prevention Plan. City staff is working with the facility on voluntary implementation of additional structural BMPs. Site 134 exhibited high pollutant levels for several parameters. This sampling site is immediately downstream from an auto salvage facility. Site 253, located immediately downstream from a rail yard, exhibited a high level of zinc.

Activity: *7.c. (1) The permittee shall develop and implement standard procedures to investigate portions of the MS4 when illicit discharges are discovered or reported.*

Standard procedures for investigation of the MS4 when illicit discharges are discovered or reported were developed in year two as required and are detailed under Activity 7.a of this report. These procedures were implemented in year three as required.

Storm Water Services investigated a total of 29 illicit discharges and storm water pollution reports during year three.

Storm Water Services investigated a total of 29 illicit discharges and storm water pollution reports during year three as listed in Table 6. This is an increase from years one and two in which there were 11 and 25 reports respectively. Although it is impossible to rule out the variable of an actual increase in illicit discharges when comparing these numbers, it is probable that this upward trend reflects an increase in citizen reporting, as targeted by efforts summarized in Activity 7.e. The upward trend may also reflect an increased awareness interdepartmentally and in the industrial/commercial community that the Storm Water Services Division is the entity providing investigation and enforcement for illicit discharge and storm water quality issues since its formation in 2002.

Figure 24 - Illicit discharge to the MS4

Informational mailings continue to be used to address and prevent illicit discharges and storm water pollution, often sent area-wide in cases where the responsible party is unknown or industry-wide if the discharge/pollution is the result of an activity suspected to be a common practice.

Activity: *7.c. (2) The permittee shall develop and follow legally sound procedures in pursuing investigations on non-storm water discharges, such as guidelines for entry, investigations of private property, notification protocols, and documentation.*

City Code Sections 96-31 through 96-36 provide legal authority and procedures for entry and investigations of private property, notification protocols, and documentation.

Activity: *7.d - Continue operation of the Emergency Spill Response Team.*

The Fire Department's Emergency Spill Response Team responds to spills in accordance with the *Hazardous Materials & Chemical Emergency Response Plan* adopted by the City of Springfield in October of 1987. A copy of the plan is on file with the City Clerk. The Emergency Spill Response Team (ESRT) is utilized as necessary to assist in spill containment and neutralization.

Table 5 – Wet-Weather Field Screening Results

Site #	Date	pH	BOD	COD	TSS	TDS	N + N	TKN	DP	TP	O&G	Fecal	CaCO3	CR	CU	PB	NI	AG	ZN
78	7/1/04	6.62	<10	31	8	133	0.85	1.89	0.25	0.38	<1	13800	50.5	<10	6.79	<20	<10	<5	141
76	7/1/04	6.85	<10	36	34	200	0.77	1.19	0.1	0.21	<1	20400	123	<10	10.9	<20	<10	<5	139
154	7/1/04	7.01	<10	11	6	187	0.18	0.67	<0.1	0.18	<1	8600	75.5	<10	<5	<20	<10	<5	<5
235	7/1/04	7.77	<10	15	13	93	0.32	1.2	<0.1	0.27	<1	270	49.3	<10	6.51	<20	<10	<5	<5
108	7/1/04	7.05	<10	16	4	133	0.09	1.08	<0.1	0.21	<1	900	49.8	<10	5.02	<20	<10	<5	<5
234	7/1/04	7.59	<10	8	10	1200	0.59	0.99	<0.1	0.14	<1	190	156	<10	<5	<20	<10	<5	<5
75	7/1/04	7.02	<10	21	<1	440	0.11	0.79	<0.1	0.24	<1	3900	42.9	<10	7.36	<20	<10	<5	<5
178	7/1/04	7.48	<10	11	4	520	1.88	1.01	<0.1	0.18	<1	15000	127	<10	6.57	<20	<10	<5	26.8
227	7/9/04	6.57	<10	22	628	120	0.21	1.59	<0.1	0.21	<1	75000	50	18.3	17.9	<20	<10	<5	108
140	7/9/04	7.89	<10	26	40	160	1.01	1.53	<0.1	0.21	<1	58000	39.6	<10	14.3	<20	<10	<5	270
126	7/9/04	7.26	<10	47	26	200	0.81	1.37	<0.1	0.18	<1	60000	41.9	<10	8.19	<20	<10	<5	163
130	7/16/04	6.9	<10	63	17	133	0.93	1.82	0.16	0.23	<1	18600	65.8	<10	7.73	<20	<10	<5	22.3
172	7/16/04	6.33	<10	52	4	320	1.13	1.99	0.09	0.15	<1	53000	49.7	<10	14.5	<20	<10	<5	53.5
171	7/16/04	6.9	<10	30	18	133	0.96	1.23	0.19	0.25	<1	66000	40.5	<10	21.9	<20	<10	<5	56.1
138	7/16/04	7.84	<10	50	2	240	0.59	1.52	0.13	0.54	<1	5950	57.8	<10	14.5	<20	<10	<5	95.3
173	8/20/04	7.92	4	41	4	720	0.19	1.57	0.05	0.21	1.2	25100	117	<10	5.93	<20	<10	<5	<5
241	8/20/04	6.65	5	57	4	140	0.07	0.93	0.08	0.42	2.3	4800	68.6	<10	<5	<20	<10	<5	<5
163	12/6/04	6.8	2	12	44	1160	1.21	<0.01	0.03	0.12	7.7	70	309	<10	<5	<20	<10	<5	6.58
80	12/6/04	6.98	2	6	48	1080	0.6	0.2	0.02	0.23	<1	170	355	<10	<5	<20	<10	<5	41.2
106	2/7/05	6.33	79	681	49	9840	0.37	21.7	4.86	5.74	3	50	438	15.5	23.8	<20	<10	<3.5	59.9
134	4/11/05	6.58	1130	1098	360	740	0.04	6.68	0.2	1.13	28	1280	1007	11.6	166	520	52.5	<5	2600
253	4/11/05	7.08	<20	29	30	320	1.91	0.75	0.05	0.29	<10	630	166	<10	12.9	45.8	<10	<5	1610
254	4/11/05	6.67	<20	18	42	180	0.13	1.59	0.1	0.26	<10	10500	40.6	<10	6.62	<20	<10	<5	53.8
135	4/11/05	6.79	2	29	48	180	0.92	0.93	0.08	0.27	<10	2700	98.1	<10	5.66	<20	<10	<5	214

Parameters are measured in mg/l, except metals are ug/l, and fecal coliform is colonies/100 ml.
Parameter Abbreviations: BOD = Biochemical Oxygen Demand; COD = Chemical Oxygen Demand; TSS = Total Suspended Solids; TDS = Total Dissolved Solids; N+N = Nitrate + Nitrite; TKN = Total Kjeldahl Nitrogen; DP = Dissolved Phosphorus; TP = Total Phosphorus; O&G = Oil & Grease; Fecal = Fecal Coliform; CaCO3 = Hardness; CR = Chromium; CU = Copper; PB = Lead; NI = Nickel; AG = Silver; ZN = Zinc

Table 6 – Illicit Discharge/Storm Water Pollution Report Investigations

Date	Description	Investigation Result
7/1/04	Mosquito complaint due to dry-weather flow in channel	Water main leak causing flow was repaired.
7/12/04	Dry-weather flow reported in box culvert	Water line leak causing flow was repaired.
7/29/04	Buckets of food grade grease dumped in drainage way	Adjacent restaurant notified to watch for dumping. Notified RR for cleanup of ROW
7/30/04	Petroleum sheen on flow from spring in Jordan Creek	MDNR notified for notation to existing file.
8/12/04	Flow from pipe discharge containing white substance	Discharge from power washing roof for resurfacing was contained on-site.
8/13/04	Residential swimming pool draining onto adjacent property	Resident notified to drain to sewer lateral or slow drainage to allow for infiltration to prevent discharge off-site.
8/23/04	Diesel fuel spill at commercial site discharged to storm water system	MDNR Emergency response supervised cleanup.
9/20/04	Report of antifreeze in street near storm drain	No antifreeze observed; no immediate sources discerned.
10/3/04	Power wash water discharging from sand bag containment area to storm drain	Sand bags repositioned for containment
10/27/04	Dark-colored water from shop vacuum dumped in storm drain at commercial site	Notified that water from shop vacuum must be disposed to sanitary sewer.
11/2/04	Spillage from grease dumpster at restaurant	Notified to keep lid closed and outside of dumpster clean; washing (floor mats, etc.) must be done inside.
11/4/04	Discharge of power wash water to street	Notified that power wash water must be contained.
11/10/04	Report of oil being dumped in storm drain and leaking drums at commercial site	No evidence of dumping or leakage from drums was observed.
11/16/04	Water discharging from building to street	Water is rainwater pumped from loading dock area; also indicated use contractor for truck washing and water discharges to street. Sent letter with wash water guidelines.
11/19/04	Carpet cleaner disposing of water in drainage way	Notified to dispose of water, including unused water from tanks, to sanitary sewer.
11/29/04	Report of discharge of automotive fluids onto adjacent property	Required cleanup and implementation of proper disposal methods
12/6/04	Spill of approx. 300 gallons of molasses	Contained in retention basin and hauled to SW treatment plant for disposal
1/4/05	Report of oil in the street contaminating storm water	Did not observe oil other than sheen typical of street runoff
1/5/05	Auto accident resulted in spill of 10-15 gallons of diesel to street	MDNR and ESRT supervised cleanup
1/7/05	Spill of meat processing waste to storm drain	Issued Notice of Violation
1/26/05	Discharge of dye process water to storm system	Sanitary sewer leak causing discharge repaired
3/9/05	Report of hosing spillage of meat processing waste into storm drain	New procedures implemented to prohibit hosing into storm drain
3/11/05	Water containing high concrete sediment load and pH discharging to storm drain	Issued Notice of Violation
3/29/05	Discharge of hydrotesting water to street	Notified to discharge to sanitary sewer or obtain NPDES permit
4/6/05	Report of open buckets of chemicals stored outside in floodplain	Contents was dried water-based paint. Owner contracted for cleanup of area
4/8/05	Report of commercial car wash waters discharging to street	Notified to use a wash bay or otherwise contain waters on-site
4/24/05	Wash waters at commercial site discharged to storm drain	Issued Notice of Violation
5/18/05	Spill of approx. 15 gallons of chlorine bleach to storm drain	Procedures implemented to prevent future spills
6/15/05	Report of paint tools being washed into storm drain	Sent letter and information about storm water pollution prevention

Activity: *7.e – Develop and implement a program that informs the public on how to report spills, illegal dumping, illicit connections and water quality problems. The program shall provide the public information as to what to look for and how to report incidents.*

The City has utilized a variety of means to inform the public on reporting illicit discharges/storm water pollution. As reported under Activity *7.d,* it is probable that the increase in the number of reports received is likely due at least in part to increased citizen awareness and reporting. The *Quality Ozark Streams* flyer included in City Utilities bills distributed to approximately 98,000 customers in October 2002, 2003 and 2004 provided phone and Internet contacts for the public to report illicit discharges/storm water pollution. The information in the 2004 flyer was also expanded to include information on "what to look for". The flyer continued to be distributed throughout the year at education and outreach opportunities summarized in Section 5.10. Pollution reporting information, including "what to look for", was also included in the Fall 2004 issue of the Choose Environmental Excellence newsletter included in Appendix C. Magnets, shown in Figure 14, were a new item utilized to educate the public on pollution reporting in year three and were distributed at education and outreach opportunities summarized in Section 5.10.

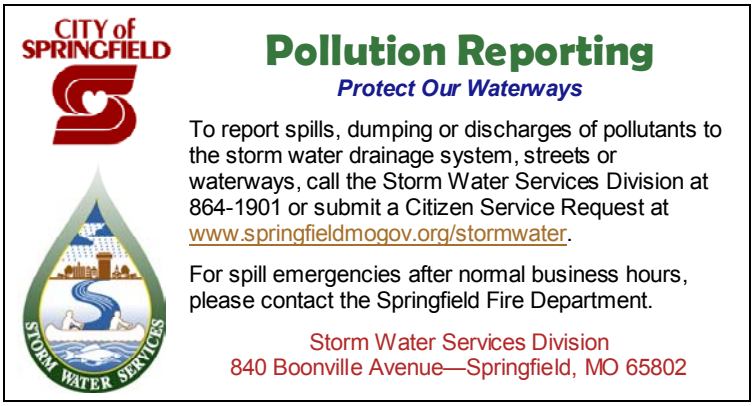


Figure 25 - Pollution reporting magnet

Activity: *7.f - Continue program that informs the public on proper management and disposal of used oil and toxic materials.*

The Solid Waste Management and Storm Water Services Divisions of Public Works provide public education on the proper management and disposal of used oil and toxic materials.

- The City's Household Chemical Collection Center (HCCC) is available to Springfield and Greene County residents for proper disposal of unneeded household chemicals, including automotive products. The Solid Waste Management Division produces and distributes a brochure that provides information about visiting the HCCC and guidelines on proper storage and handling of household chemicals. This information is also available on the Division's web page at www.springfieldmogov.org/recycling. The HCCC was also highlighted on the *Quality Ozark Streams* flyer included in City Utilities bills distributed to approximately 98,000 customers in October 2002, 2003 and 2004. This flyer is included in Appendix C. As summarized in the Calendar of Activities in Section 5.10, information about the HCCC was also provided at education and outreach opportunities, and tours of the facility were given to school classes and other interested groups. In 2004-2005, 102,533 lbs. of household materials were collected at the HCCC. Of this total, 83% or 85,247 lbs. were recycled. A 10-year comparison showing a breakdown of the types of materials collected and recycled is included in Appendix B.

- The Solid Waste Management Division publishes a *Guide to Recycling in Springfield* that includes a list of local retailers that accept used oil. This guide is distributed as a brochure and is also available on the Division's web page at www.springfieldmogov.org/recycling.

The City cosponsored two electronic waste collection events during year three. During the America Recycles Day event in November 2004, 7.1 tons of e-waste was collected. During the Earth Day event in April 2005, 7.5 tons was collected. Over 95% of this waste will be recycled at the Computer Recycling Center, a privately owned facility in Springfield.

Activity: *7.g - Implement program to reduce or eliminate to the extent practicable the inflow, infiltration and discharge of sanitary sewage into the MS4.*

A primary objective of the City's Infiltration and Inflow (I/I) Program is to reduce to the maximum extent practicable the occurrence of sanitary sewer overflows (SSOs) into the MS4. A Sewer System Evaluation Survey (SSES) was completed system-wide in June 2003. The SSES was conducted to identify possible sources of I/I. The correlation of measurements from rainfall and flow monitoring using flow meters placed at varying locations throughout the sanitary sewer system was studied to indicate the extent of I/I. Several methods were then used to identify the specific sources of I/I. These methods include visual inspection to locate faults in manhole covers and accessible pipes, TV inspection to assess internal pipe conditions, and dye and smoke testing to locate and confirm faulty sewer pipes that may not be readily visible.

Once specific sources of I/I are identified, rehabilitation is performed using manhole wall spraying, in-place pipe relining, and manhole frame and lid replacement. Currently, 3 regular full-time and 5-8 contract personnel conduct rehabilitation of the system. Some rehabilitation is also done by contractors. During 2004-2005, 3,651 lineal feet of sanitary sewer lines and 728 manholes were rehabilitated. Since 1996, 64,559 lineal feet and 12,583 manholes have been rehabilitated, resulting in over 81.15 million gallons per day reduction of wet-weather flows. Wet-weather SSOs have significantly decreased in both frequency and duration. Treatment plant flows during wet-weather conditions have experienced similar decreases in both frequency and duration of peak flow events. Ten percent of sanitary sewer revenues are earmarked to finance ongoing I/I programs. Since 1995, the City has committed over $16 million to fund the I/I program.

During 2004-2005, 3,651 lineal feet of sanitary sewer lines and 728 manholes were rehabilitated.

Figure 26 - Rehabilitation of a sanitary sewer manhole

Following the completion of the SSES, it has been determined that the wastewater utility should continue the I/I Program as an ongoing effort to look for opportunities to efficiently and economically reduce SSOs and I/I impacts on the wastewater infrastructure. Virtually all I/I and SSO reduction has been accomplished on the public side of the wastewater infrastructure. Studies by the wastewater utility have shown that at least 50% of the source and intrusion of wet-weather flows into the sanitary sewer system are derived from private sources, i.e. broken or leaky building sewers, leaky basements, and illegal connections of footing drains, roof drains, sump pumps, area drains, etc. Because these sources are on private property they cannot be corrected unilaterally by the wastewater utility. A funding mechanism and public acceptance of a private I/I reduction program is needed to effectively address the SSO problem. The I/I and SSO problems are often related to inadequate storm water systems and could be addressed in a cooperative manner in many cases. Information about the City's Infiltration and Inflow Program is available on the City's website at www.springfieldmogov.org/sanitary/infiltration.html.

5.8 – Monitor and Control Pollutants from Industrial and High Risk Runoff

Activity: *8.a – The city will develop a program to identify the following industries that discharge to the MS4:*

1. *Municipal landfills*
2. *Hazardous waste treatment, storage and disposal facilities*
3. *Industries subject to reporting requirements pursuant to SARA Title III Section 313; and*
4. *Industrial facilities that the city determines are contributing a substantial loading of pollutants to the MS4.*

The City has identified the industry categories listed above.

1. There are no active municipal landfills within the City limits.
2. The following list of hazardous waste treatment, storage and disposal (TSD) facilities was obtained from the Missouri Department of Natural Resources website (www.dnr.mo.gov/).

   - Clariant LSM Inc. – 2460 W. Bennett St.
   - Kerr-McGee – 2800 W. High St.
   - Safety-Kleen – 734 N. West Bypass
   - VOPAK USA Inc. – 505 E Trafficway
   - Zenith Electronics Corp. (Tracker Marine) – 2500 E. Kearney St.

3. Information on industries subject to reporting requirements pursuant to SARA Title III Section 313 was obtained from the State of Missouri Toxics Release Inventory Summary Report: 2003 Data (MDNR 2005). The appendix pages from this report containing a listing of reporting facilities for Springfield are included in Appendix B.
4. Facilities determined by the City as contributing a substantial loading of pollutants to the MS4 will be identified through the field screening program summarized under Activity 7.b or through public reporting information. As summarized under Activity 7.b in Section 5.7 of the second annual report, the facility at site 106 was identified as a priority for additional monitoring. In year three, additional monitoring was completed and the facility was included in the inspection program developed in Activity 8.b.

Activity: *8.b – Develop a self-monitoring program for facilities identified in 8.a above. This monitoring program will include the collection of quantitative data on any pollutants limited in an existing NPDES permit for an identified facility.*

The first step in development of a program to fulfill Activity 8.b was identification of the facilities to be included in the program. The following is a summary of the facilities identified in 8.a.

- The SARA Title III Section 313 reporting list included in the second annual report included 29 industrial facilities. Two of those facilities, Liberty Industries and Ridewell Corp., are located outside of Springfield. Additionally, 2 facilities, Kerr-McGee and Interconnect Tech Litton Systems Assembly, are no longer in operation. This results in a total of 24 industrial facilities on the list.
- Three of the TSD facilities listed in 8a are no longer in operation. One of these is Kerr-McGee as mentioned above. The other two are VOPAK USA Inc. and Zenith Electronics Corp. The remaining two TSD facilities, Clariant LSM, Inc. and Safety-Kleen, are also two of the 24 facilities on the SARA Title III Section 313 list.
- One facility was identified, as noted, under #4

All but 3 of these 25 facilities have NPDES storm water permits issued by MDNR that require self-monitoring, either through a sampling program for storm water and/or other permitted discharges, implementation of a Storm Water Pollution Prevention Plan (SWPPP), or a combination of both. Rather than duplicate these existing requirements for these facilities, the program developed includes a site inspection by Storm Water Services staff based on the checklist in Appendix B as well as collection of quantitative data on pollutants limited in NPDES permits for these facilities. Data collection was implemented through written requests to these facilities to provide Storm Water Services copies of Discharge Monitoring Reports when sent to MDNR as required by their permits.

Storm Water Services staff conducted inspections at 24 of the 25 facilities during May and June 2005. An inspection could not be scheduled at the remaining facility due to temporary facility staffing relocations. It is anticipated that this inspection will be completed in year four. The inspections proved to be mutually beneficial, providing an opportunity for Storm Water Services staff to become familiar with the site characteristics and operations of each facility while providing facility staff an opportunity for self-assessment based on the indications of the inspection. It also served as an opportunity for outreach in terms of introducing these facilities to the services provided by the Storm Water Services Division and providing points of contact for both parties. The inspections resulted in recommendations being made to 5 facilities.

5.9 – Construction Site Runoff

Activity: *9.a - Continue current erosion and sediment control regulations for land disturbance activities for areas less than five acres.*

Section 96-21 of the City Code states:

"No person shall cause or allow sediment to be deposited in any public street, public land, or on any property not under their control as a result of land disturbance of less than five acres resulting from construction activities."

The City Code requires that all persons engaged in land development or land disturbance activities within the City limits must adhere to the *Erosion and Sediment Control Guidelines* issued by the Director of Building Development Services and on file with the City Clerk. These guidelines are designed to meet the following objectives:

- Minimize the area disturbed by construction and development
- Provide for containment of sediment until areas are stabilized
- Stabilize disturbed areas as soon as practical after project completion
- Provide permanent erosion, drainage, and detention controls

All site development plans are reviewed by both Building Development Services and Storm Water Services. All plans receive a stamp indicating that erosion and sediment control measures must be followed. Site inspections are conducted by Building Development Services. Development plans for subdivisions, which are reviewed by Storm Water Services, must also include measures for erosion and sediment control. Public Works conducts site inspections of subdivisions.

Public Works maintains a MOR100 land disturbance permit issued by MDNR for all Public Works construction projects with land disturbance of 1 acre or more as required. The City submits a quarterly activity report to MDNR detailing the status of land disturbance sites.

Activity: *9.b - Continue to require land disturbance permits from the MDNR for sites of five or more acres.*

During the first permit year, in compliance with new MDNR regulations, the City expanded the requirement for a land disturbance permit from MDNR to include sites of one or more acres. Additionally, a procedure was implemented requiring developers to show that they have obtained the necessary permit from MDNR before the City will issue a building permit.

Activity: 9.c - *Provide information for education of construction site operators.*

New designers or those unfamiliar with the City's policies are provided an informational packet that includes a copy of the *Erosion and Sediment Control Guidelines*. These guidelines are also available on the City's website at www.springfieldmogov.org/stormwater/stormwater_docs. Review and inspection staff members work to educate site designers and construction site operators when possible. In January 2005, City personnel gave presentations on erosion & sediment control at seminars during the Construction Specification Institute Southwest Missouri Chapter trade show.

5.10 - Comprehensive Education and Public Outreach Program

Storm water education and public outreach activities include displays and presentations at community events, media and publications opportunities, and presentations and workshops for area audiences. Storm water/water quality issues are the primary focus of many education and public outreach activities while also being included as a closely related topic in the educational activities of the Solid Waste Management Division. This combined educational focus highlights the dual benefits for solid waste management and storm water quality of such programs as the Household Chemical Collection Center (HCCC) and the Yardwaste Recycling Center (YRC). Storm water education activities during year three are described below. The City also provides funding support to the Watershed Committee of the Ozarks and James River Basin Partnership. These local organizations provide public education and outreach on water quality issues.

Education/Outreach Tools and Programs Developed During Year Three:

- The Storm Water Services Division developed a logo during year three for use in public education efforts. The logo, shown in Figure 27, depicts the connection between storm water runoff and area waterways.

Figure 27 - Storm Water Services Division logo

- The Storm Water Services Division developed a set of brochures during year three for public education efforts. The set, included in Appendix C, contains a Division brochure describing the services and programs provided as well as three storm water pollution prevention brochures focusing on:
  - *What You Can Do At Home*
  - *Business Tips and Guidelines*
  - *Automotive Business – Repair, Cleaning and Salvage*

- A tabletop display was created for use at education and outreach opportunities. The display includes information on the permit activities, storm water pollution prevention, and reporting illegal dumping/illicit discharges as well as other information. The display debuted in October 2004 at the Jordan Creek Feasibility Study Public Meeting and continued to be utilized at events throughout the year including the Construction Specification Institute Southwest Missouri Chapter trade show, Earth Day at the Discovery Center, and James River Basin Partnership's River Rescue event.

- In November 2004, the City implemented a project to install signs at 27 stream crossings on Fassnight, Galloway, Jordan, South, and Wilsons Creeks and Ward Branch. The signs, as shown in Figure 17, include the stream name as well as the message "Protect Our Waterways". This project was initiated as an educational effort to raise public awareness about recognizing and protecting the water quality of urban streams.

> **"We want to encourage the public to recognize that our urban streams are a valuable water resource providing natural habitat and recreational opportunities for our community to enjoy."**
> **- Todd Wagner, Principal Storm Water Engineer.**

- The City launched an Adopt-A-Stream program in May 2005. This program was modeled after the City's Adopt-A-Street program that began in 1989 and has grown to include over 170 organizations volunteering to keep more than 117 miles of city roadways clean. While Adopt-A-Street helps keep trash out of area waterways by cleaning up city streets, Adopt-A-Stream creates opportunities for volunteers to help by cleaning up when trash and other items do end up in these waterways. Volunteers adopt at least a 0.5 miles section of stream for a one-year commitment and conduct at least 3 cleanups of the section during that year. The City provides trash bags and collection of the bags as well as recognition of the volunteers on signs installed at the stream section and on the Storm Water Services website.

Greater Ozarks Audubon was the program's charter participant. For over six years, this group has been working on South Creek between National and Campbell along Sunset. Their work has included removing trash, plant management, and other beautification projects.

Public response to the program was enthusiastic. An adoption list was developed of stream sections on city-owned property. To date, 16 of these 17 sections have been adopted totaling 10 miles of stream, 1 adoption is pending, and a waiting list is being maintained to fulfill future adoption opportunities. The next annual report will detail the program's first year, including the amount of trash collected. The Adopt-A-Stream brochure and a list of participants to date are included in Appendix C.

Figure 28 - "Protect Our Waterways" and Adopt-A-Stream signs

- The City has partnered with James River Basin Partnership to continue efforts to install storm drain markers on inlets around the city. The Storm Water Services Division purchased 500 markers customized for the James River watershed, as shown in Figure 29. James River Basin Partnership is coordinating volunteers to install these markers. In May 2005, a local Boy Scout troop installed approximately 50 markers in a south Springfield neighborhood. This activity also involves distributing door hangers that provide storm water pollution prevention information to residents.

Figure 29 - Storm drain marker customized for the James River watershed

- The City launched a new education program in March 2005 called the Municipal Government Academy. This program educates participants about City functions and operations in hopes of developing citizen leaders. The free, 10-week interactive course uses informative presentations on various City departments as well as interesting tours of City facilities to help participants become more familiar with the structure and functions of City government.

  The course includes sessions on Public Works, including the NPDES storm water management program and the Solid Waste Management Division services. Packets are also provided with brochures and information on storm water pollution prevention and illicit discharge reporting, the HCCC, and SMY&N. Each course is open to 30-35 individuals.

Figure 30 - Local Boy Scout troop installing storm drain markers

- TV23, the City's Municipal Government cable channel, began airing two programs focusing on water quality in October 2004. *After the Storm*, co-produced by EPA and The Weather Channel, includes three case studies focusing on storm water pollution. *Keeping Our Waters Clean,* produced by MDNR, provides an easy-to-understand look at non-point source pollution and the TMDL program. The two programs continued to air weekly on TV23 throughout year three. The videos are also available for checkout from the Storm Water Services Division.

- The Springfield-Greene County Parks Department has installed bag dispensers and receptacles for pickup and disposal of dog waste at Chesterfield, Phelps Grove, Young/Lilley, Cooper and Sequiota Parks. These units, shown in Figure 31, help keep pet waste from contaminating storm water runoff and educate the public that pet waste can be a pollutant.

Figure 31 - Bag dispenser for picking up dog waste at Sequiota Park

Additional Education/Outreach Tools and Programs Utilized During Year Three:

- An educational flyer titled *Quality Ozark Streams* was included in City Utilities bills distributed to approximately 98,000 customers in both October 2002, 2003 and again in 2004. The flyer includes information on the City's NPDES Permit, along with examples of how the public can help prevent storm water pollution. These examples include the proper disposal of yardwaste and household chemicals, reporting illegal dumping/illicit discharges, as well as guidelines for responsible yard care. The flyer was redesigned for the 2004 distribution to allow the addition of examples of "What to Look For" when reporting illegal dumping and illicit discharges as part of the development of the public reporting education program required by Activity 7.e. The redesigned flyer also included information on inquiring about good storm water practices as well as the role of trees in flood control and water quality. The flyer is included in Appendix C.

- Following the major revision of the Storm Water Services Division website in December 2003, the Division has continued to utilize the website as a public education tool by continually updating and adding new information and promoting the website on publications and at outreach opportunities. Figure 31 shows the general upward trend of visits to the website which have increased from approximately 100 to almost 1000 per quarter in the last 2 years. The website address is www.springfieldmogov.org/stormwater.

- An exhibit titled *Our Watershed* is available for interactive learning at the Discovery Center of Springfield. The exhibit contains a variety of information on storm water runoff, septic tanks, karst topography, and land uses as related to watershed issues. The exhibit, which was coordinated by the Watershed Committee of the Ozarks, received grant funding from the Missouri Department of Natural Resources with additional funding from the Solid Waste Management and Sanitary Services Divisions of Public Works, and Silver Dollar City. The exhibit is utilized in water education events.

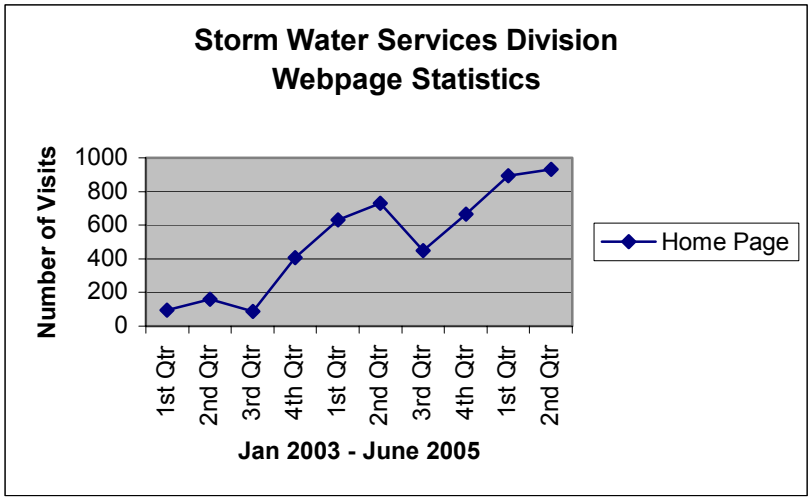


Figure 32 – Storm Water Services Division webpage statistics

- The City's water quality related divisions and services are featured in two local guides – the ***Choose Environmental Excellence*** *Springfield Area Directory of Environmental Agencies and Organizations* and the Interpreters Coalition of Greene County *Community Resource Guide*. The CEE directory, which includes listings for the Storm Water Services and Solid Waste Management Divisions and the Industrial Pretreatment Program, provides contact info and descriptions of services provided by local agencies and organizations involved in environmental issues. The Community Resource Guide, which includes listings for the HCCC, Yardwaste Recycling Center, and Southwest Wastewater Treatment Plant, provides information about community resources available for field education and hands-on learning.

- The Environmental Report Card is an effort to monitor environmental indicators over time in Greene County and provide a report of these indicators to the public. These indicators include measurements of water quality and quantity, community health, solid waste/recycling, air quality, and population. The *2005 Environmental Report Card*, which covers the same time period as the third permit year, includes a section on urban storm water runoff and water quality. The report, available at www.springfieldmogov.org/health, is a collaborative effort of the Environmental Collaborative of the Community Partnership of the Ozarks, Springfield-Greene County Environmental Advisory Board, Springfield-Greene County Health Department, Springfield-Greene County Park Board, City of Springfield Public Works, Ozark Greenways, and the Watershed Committee of the Ozarks.

- The Community Focus Report is an annual report that highlights the strengths and successes as well as areas for improvement in Springfield and Greene County. The Natural Environment section of the 2005 report highlights the strengths of the City's Storm Water Management Program as well as the need for additional funding to continue to improve the program. The report is a collaborative effort of the Community Foundation of the Ozarks, Junior League of Springfield, Springfield Area Chamber of Commerce, Springfield-Greene County Library District, and United Way of the Ozarks. The report is available at www.springfieldcommunityfocus.org.

Calendar of Activities

July 2004
- Habitat for Humanity Low Impact Development project open house
- Presentation on water quality issues to SMSU class

August 2004
- Free Wheelin' Friday – Tour of field trip locations for Springfield Public School teachers, including City's Northwest Wastewater Treatment Plant; Information provided about HCCC
- Genesis Day – Provided educational materials for Springfield Public Schools workshop, including information on the Household Chemical Collection Center
- Presentation on water conservation and pollution prevention to Professional Grounds Management Society local chapter
- Presentation on recycling, including HCCC, to 4th grade class

September 2004
- 3 presentations on recycling, including HCCC, to SMSU classes
- Campbell pedestrian underpass ribbon cutting
- Live spot on KY3 TV about yardwaste, composting and mulching
- *Let's Make a Splash!* water education festival at the Discovery Center of Springfield for 3rd & 4th grade classes.
- Article by Springfield News-leader about *Let's Make a Splash* water education festival
- Presentations on Jordan Creek Feasibility Study to Jordan Valley Park committee and City Council
- Article by Springfield News-leader about 20th anniversary of Watershed Committee of the Ozarks, highlighting Valley Water Mill Watershed Center project

October 2004
- *Quality Ozark Streams* flyer in City Utilities customer bills (See Appendix C)
- Choose Environmental Excellence Fall 2004 Newsletter
- Jordan Creek Feasibility Study public meeting; debut of Storm Water Services Division display
- Presentation on SMY&N to Rosettes Garden Club
- SMY&N display and other educational materials at Springfield Business Expo
- Tour of Springfield Sanitary Landfill, including focus on storm water management
- Presentation on recycling, including HCCC, to Willard High School class
- Presentation including HCCC at Certified Hazardous Materials Managers meeting
- KY3 TV interview about yardwaste
- Campbell Avenue Pedestrian Underpass ribbon cutting

November 2004
- Salt storage facility ribbon cutting
- Tour of HCCC for Willard High School class
- America Recycles Day activities cosponsored by the City with HCCC display and an electronic waste collection event.
- Presentation on recycling and water quality to retired teachers group
- Presentation on recycling, including the HCCC, to SMS class
- Stream sign project news release
- Article by Springfield News-leader about stream sign project
- Jordan Creek floodplain acquisition news release
- Article by Springfield News-leader about Jordan Creek floodplain acquisition
- Article by Springfield Business Journal about Jordan Creek Feasibility Study
- News releases on stream sign project and Jordan Creek floodplain acquisition in Community Free Press Midweek newspaper
- KOLR10 TV News spot on proper disposal of yardwaste

December 2004
- Presentation on SMY&N to MU Extension staff

January 2005
- NPDES Storm Water Permit Annual Report 2003-2004 news release
- Annual report news release in Community Free Press Midweek newspaper
- Presentation on recycling, including HCCC, to Environmental Advisory Board Solid Waste subcommittee
- Storm water display and erosion/sediment control workshops at Construction Specifications Institute Southwest MO Chapter trade show

February 2005
- Article by Springfield News-leader on storm water management program and annual report
- SMY&N and Solid Waste Management Division displays at the Springfield Home Show at the Jordan Valley Park Exposition Center
- SMY&N display and seminar, Solid Waste Management Division display, and storm water informational materials at the Lawn & Garden Show at the Ozark Empire Fairgrounds
- Storm water pollution prevention, recycling, and SMY&N informational materials provided for Heart of the Westside Center grand opening
- Presentation on recycling, including HCCC, to Earth Science for Teachers class
- Presentation on SMY&N to Environmental Advisory Board
- Workshop on environmentally sound gardening for MU Extension class
- Presentation on NPDES storm water management program to NRCS Water Quality Office

March 2005
- Presentation on recycling, including HCCC, to Boy Scout troop
- Tour of Northwest Wastewater Treatment Plant and Springfield Sanitary Landfill for SMSU class
- Presentation and tour of HCCC for Students Go To Work class
- Presentation on recycling and construction waste to Women In Construction group
- 2 tours of HCCC for home school group
- Presentation on Storm Water Services and Solid Waste Management Divisions, including distribution of storm water, recycling, and SMY&N informational packets, to Municipal Academy class
- SMY&N display and workshop at Naturescaping Symposium at Springfield Conservation Nature Center
- Interview about SMY&N on KWTO radio
- Presentation on storm water funding needs to Vision 20/20 storm water funding workgroup

April 2005
- Earth Day observance included a month of hands-on work projects and educational opportunities and a citywide celebration on Saturday, April 23 (See Appendix C). Events included:
  - Public debut of Watershed Committee's interactive karst/water quality kiosk and water quality bags for Springfield-Greene County Library
  - Electronic waste collection at the Lone Pine Recycling Center cosponsored by the Solid Waste Management Division and the Computer Recycling Center
  - Celebration at the Discovery Center of Springfield, including displays from Storm Water Services and Solid Waste Management Divisions and others.
  - Boy Scouts Good Turn for America Environmental Stewardship Event at Lake Springfield including exhibits and activities by the Public Works, Springfield-Greene County Parks, James River Basin Partnership and many others.
- Provided storm water, recycling, and SMY&N informational materials to General Electric employee fair
- Presentation on SMY&N to Heart of the Westside community group
- Presentation on the Interpreters Coalition of Greene County *Community Resource Guide,* including availability of tours of HCCC and wastewater treatment plants

- Presentation on SMY&N to Professional Grounds Management Society local chapter
- Presentation on City's water quality efforts to MDNR *Healthy Water Healthy People* workshop
- Presentation on HCCC to Doling Senior Center
- Workshop on SMY&N for City of Ozark Parks Dept
- Presentation on City's NPDES Storm Water Management Program and Solid Waste Management Division at International Right-of-Way Association regional seminar
- Presentation on NPDES storm water management program and sinkhole issues to SMSU Environmental Assessment class

May 2005

- Adopt-A-Stream news release
- Interviews with KTTS and KSMU radio stations about Adopt-A-Stream
- KOLR 10 TV news spot about Adopt-A-Stream
- Article by Springfield News-leader about Adopt-A-Stream
- Workshop on SMY&N at Wonders of Wildlife museum
- Presentation on recycling, including HCCC for Delta Kappa Gamma Teachers group
- Presentation on SMY&N to League of Women Voters
- Storm water, SMY&N, and recycling informational materials display at Discovery Center for Public Works Week
- Tour of HCCC for Bailey School
- Article on SMY&N in Community Voice newspaper

June 2005

- Article on Adopt-A-Stream in Springfield Business Journal
- Storm Water Services, Solid Waste Management, and SMY&N displays at River Rescue event sponsored by James River Basin Partnership
- SMY&N display and composting/mulching workshops at Springfield Garden Symposium
- Tour of Yardwaste Recycling Center for Stockton High School
- Tour of Springfield Sanitary Landfill, including storm water management, for Pleasant Hope High School
- Tour of HCCC and Yardwaste Recycling Center for Columbia and Fulton municipal staff
- Tour of Yardwaste Recycling Center for home school group

6.0 Monitoring Section

6.1 - Inventory of Known Major Outfalls

Major outfalls were identified based on the following definitions from 10 CSR 20-6:

- "Outfall. A point source as defined by 10 CSR 20-2.010 at the point where a municipal separate storm sewer discharges and does not include open conveyances connecting two (2) municipal separate storm sewers, pipes, tunnels or other conveyances which connect segments of waters of the state and are used to convey waters of the state."
- "Major municipal separate storm sewer system outfall (major outfall). A municipal separate storm sewer outfall that discharges from a single pipe with an inside diameter of thirty-six inches (36") or more (or its equivalent) or for municipal separate storm sewers that receive storm waters from lands zoned for industrial activity within the municipal separate storm sewer system with an outfall that discharges from a single pipe with an inside diameter of twelve inches (12") or more (or from its equivalent). Industrial activity areas do not include commercial areas."

The equivalent of a single pipe with an inside diameter of thirty-six inches or more is further defined in 40 CFR Part 122.26 as "…discharge from a single conveyance other than circular pipe which is associated with a drainage area of

more than 50 acres". The equivalent of a single pipe with an inside diameter of twelve inches or more is further defined as "…discharge from other than a circular pipe associated with a drainage area of 2 acres or more".

According to these definitions, the following types of discharge points were identified as major outfalls:

- A single pipe with an inside diameter of 36 inches or more (or a single conveyance that drains an area of more than 50 acres) that discharges at the municipal boundary or discharges into waters of the state.
- In areas zoned for industrial activity, a single pipe with an inside diameter of 12 inches or more (or a single conveyance that drains an area of 2 acres or more) that discharges at the municipal boundary or discharges into waters of the state.

Known major outfalls are listed in Appendix B. Additional major outfalls will be identified as mapping of the MS4 progresses.

6.2 – Estimate of Total Annual Volume of Urban Runoff Discharges

The total annual volume of urban runoff discharges for the City is estimated to be 11.1 billion gallons for year three.

The total annual volume of urban runoff discharges for the City is estimated to be 11.1 billion gallons as shown in Table 7. The calculation is based on a total precipitation during year three of 40.85" according to the National Weather Service station at the Springfield-Branson Regional Airport. To calculate this estimate, the individual precipitation events that occurred throughout the year were categorized by precipitation amount as shown in Table 7. The runoff volumes for categories 5 and 6 were calculated using the Runoff Curve Number method (Soil Conservation Service 1986). This method uses the following equation:

$$Q = \frac{(P - I_a)^2}{(P - I_a) + S}$$

where

Q = runoff (inches)
P = rainfall (inches)
S = potential maximum retention after runoff begins (inches)
I_a = initial abstraction (inches)

and

$$I_a = 0.2S$$

$$S = \frac{1000}{CN} - 10$$

where

CN = curve number ranging from 0-100 that is determined by knowing the hydrologic soil group and land cover type

The CN is a weighted average of the CN for the impervious and pervious cover types according to the percentage of these types in the City limits. The percentage of impervious cover and the type and percentage of pervious cover were estimated through examination of aerial photographs of the City. The total discharge volume is determined by multiplying Q by the total area within the City limits. The following numbers were used in calculating the runoff volume for categories 5 and 6:

- % Impervious = 35

- Impervious CN = 98
- % Pervious Cover = 65
- Pervious CN = 73
- City area = 50,696 acres

Using the SCS Curve Number method, the precipitation amount for categories 1-3 is not great enough to overcome the calculated infiltration loss, resulting in a runoff volume of zero. However, experience dictates that these small rainfall events do in fact create a substantial amount of runoff, which is largely due to the amount of directly connected impervious area within the watershed. Therefore, a more accurate estimate for these categories can be obtained by assuming that directly connected impervious area is the sole source of runoff from precipitation events in these categories. The area within the City limits is estimated to be 35% impervious. It is estimated that half of the impervious area, equaling 8,871 acres, is directly connected. The runoff volume for these categories is estimated by multiplying the precipitation amount by 8,871 acres. For category 4, the calculation of runoff using the SCS Curve Number method results in a volume less than the calculated volume for category 3. Therefore, the runoff volume for category 4 was calculated with the same method used for categories 1-3.

Table 7 – Total Annual Volume of Urban Runoff Discharges

Precipitation Category (inches)		Average Precipitation	# of Events Per Category	Runoff "Q" (inches over total city area)	Runoff Volume Per Event		Total Runoff Volume	
					Cubic Feet	Gallons	Cubic Feet	Gallons
#1	0 – 0.1	0.04	37	0.007	1,288,074	9,612,494	47,658,746	355,662,287
#2	0.11 – 0.2	0.15	23	0.026	4,830,278	36,046,853	111,096,402	829,077,627
#3	0.21 – 0.4	0.28	17	0.049	9,016,520	67,287,460	153,280,833	1,143,886,813
#4	0.41 – 0.8	0.62	19	0.109	19,965,151	148,993,661	379,337,860	2,830,879,551
#5	0.81 – 1.6	1.11	10	0.152	27,976,760	208,781,792	279,767,601	2,087,817,917
#6	>1.6	2.10	4	0.704	129,480,382	966,271,504	517,921,526	3,865,086,018
							1,489,062,968	11,112,410,213

6.3 – Monitoring Program Summary

6.3.1 Program Rationale

The Representative Monitoring Program and the Field Screening Program comprise a two-fold approach to monitoring the MS4. These programs will establish a base line from which to monitor the effectiveness of the SWMP. Table 3 on page 29 illustrates the calendar schedule specified in the Permit for these programs. The Field Screening Program, which serves to identify illicit discharges and quantify the quality of storm water from industrial areas to the MS4, is discussed in Section 5.6 of this report. The Representative Monitoring Program consists of the following sampling schedule as shown in Table 2:

- Ambient sampling representing the quality of the stream base flow, to be completed at each of the six in-stream locations during the second weeks of November, March, and May.
- Wet-weather sampling, representing the influence of storm water runoff on water quality, to be completed once at each of the six in-stream locations during the period of March 1 through May 31.

The Representative Monitoring Program represents a shift from in-system sampling and land-use based characterization to in-stream sampling with a regional perspective. In Part 1 of the original Permit application, six points were identified as being representative of either residential, commercial or industrial land uses in the City. The data collected and presented in Part 2 of the application indicates that pollutant levels in storm water from these land uses are generally

below the Nationwide Urban Runoff Program (NURP) event mean concentrations for the respective land use types. It was proposed to use six in-stream locations representative of the City's entire watershed to better measure the effectiveness of the SWMP. These six in-stream locations are near the City limits and emphasize the cumulative effect of storm water runoff from the minor watersheds identified in Parts 1 and 2 of the Permit application. These locations are listed below and shown in Figure 33.

1. **South Creek at Golden.** This location drains mostly residential.
2. **Jordan Creek at Bennett.** This location drains the oldest and most industrialized portion of the City.
3. **Wilsons Creek at Farm Road 146.** This location drains approximately 40% of the City, including the oldest portion of the City.
4. **Galloway at Highway 60.** This location drains an area of the City representing all the land uses i.e. small to large residential lots, commercial, and manufacturing.
5. **Jones Spring.** This location drains a large sinkhole cluster area of the City.
6. **Pea Ridge at Farm Road 102.** This location drains the northern portion of the City and has Interstate-44 running through the drainage area.

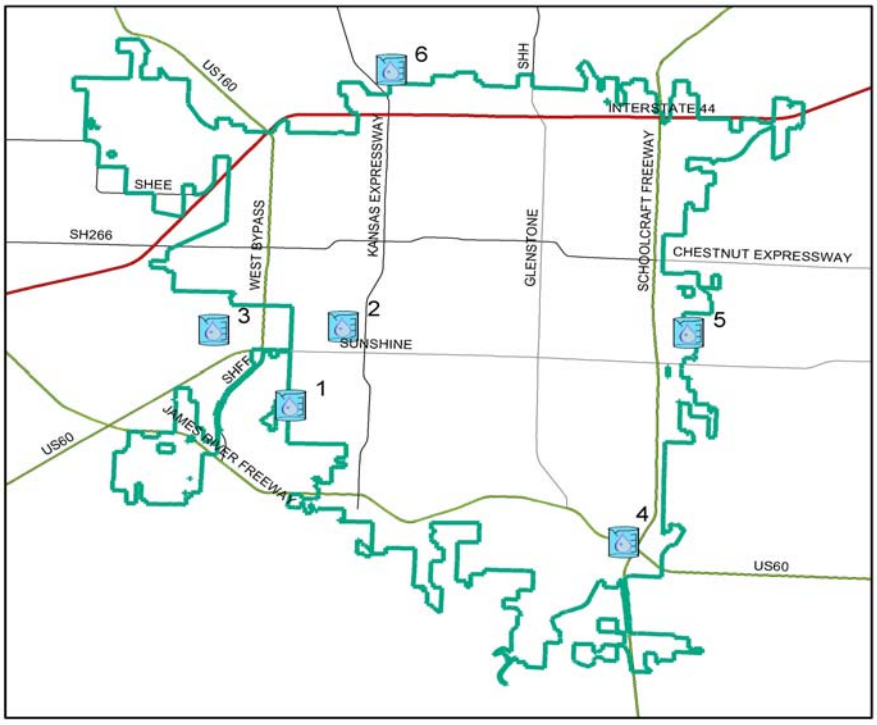


Figure 33 - Sampling sites for Representative Monitoring Program

6.3.2 Storm Event Data

The storm event data for the wet-weather sampling event on March 23 is reported as specified under Part V.A.2 of the Permit. The storm event sampled occurred on March 22-23. According to data from the National Weather Service station at the Springfield-Branson Regional Airport, the event total rainfall was 0.72" occurring over 11 hours. The previous measurable storm event occurred on March 21-22 with a total rainfall of 0.11" ending approximately 8 hours before the sampled storm event. The total discharge volumes at each of the six sampling locations for the sampled storm event of March 22-23 were estimated using the SCS Runoff Curve Number method (Soil Conservation Service 1986) outlined in Section 6.2. Runoff from directly connected areas and unconnected areas were calculated separately and summed to account for runoff from directly connected areas during small rain events. The impervious, pervious, and directly connected percentages were estimated based on aerial photography. The total discharge volumes are listed

in Table 8 along with the calculation values used. The total discharge volume for Jones Spring was calculated by using a basin area of 48 contributing sinkholes and assuming that all water entering these sinkholes discharges at Jones Spring.

Table 8 – Discharge Volumes for Wet-Weather In-Stream Sampling Event

Outfall Location	Impervious %	Impervious CN	Pervious %	Pervious CN	Directly Connected %	Directly Con. CN	Basin Area (acres)	Discharge Volume (cubic feet)	Discharge Volume (gallons)
South Creek at Golden	25	98	75	75	11	98	3,305	803,501	6,010,993
Jordan Creek at Bennett St.	30	98	70	75	20	98	8,780	3,525,283	26,372,643
Wilsons Creek at FR 146	28	98	72	75	12	98	19,174	5,179,891	38,750,764
Galloway Creek at Hwy 60	25	98	75	72	13	98	4,323	1,088,055	8,139,741
Jones Spring	23	98	77	76	10	98	1,832	427,112	3,195,222
Pea Ridge Creek at FR 102	22	98	78	72	7	98	5,497	781,619	5,847,290

6.3.3 Monitoring Results and Discussion

Samples were analyzed at the City's Wastewater Laboratory at the Southwest Wastewater Treatment Plant. The results for the conventional parameters listed in Part V. of the Permit are shown in Table 9. The results for the metals listed in Part. V of the Permit are shown in Table 10. All of the results for pesticides, volatile organics (method 624 & 603), and acid/base neutral organics (method 625) listed in Part V. of the Permit were below the detectable levels. One set of the lab analysis sheets showing the detectable levels for these parameters is included in Appendix B. The lab analysis sheets for the individual sampling events were previously submitted to MDNR along with the results for the conventional parameters and metals. As noted in Table 9, the dissolved phosphorus sample for Wilsons Creek on March 23 was contaminated, resulting in a test failure. As noted in Table 10, the method used for metals analysis was changed beginning with the sampling event on March 8. The permit does not specify a method. Prior to March 8, the method used was for total metals. For comparison with Missouri Water Quality Standards *(10 CSR 20-7.031)* that specify total recoverable metals for mercury and total dissolved metals for all other metals, the methods were changed. Hardness was voluntarily added to the parameter list beginning with the March 8 sample because several of the standards for metals are hardness-dependent.

The results were compared with the Missouri Water Quality Standards at *10 CSR 20-7.031*. Jordan Creek, Pea Ridge Creek, Galloway Creek, Wilsons Creek, and South Creek are all classified as general warm-water fisheries with use designations for Livestock & Wildlife Watering and Protection of Warm Water Aquatic Life and Human Health – Fish Consumption. Pea Ridge Creek is additionally designated as a Drinking Water Supply. Jones Spring is not specifically classified. For the purpose of this evaluation, the criteria for Groundwater was used for evaluation of results from Jones Spring as well as criteria for Livestock & Wildlife Watering and Protection of Warm Water Aquatic Life and Human Health – Fish Consumption since Jones Spring contributes surface water to the Jones Branch tributary of Pearson Creek. All results were compared to the chronic criteria as specified in the water quality standards for Livestock & Wildlife Watering.

<u>pH</u>

Measurements of pH were taken in-stream at the time of sampling with an Oakton pH/DO meter. All of the pH measurements were within the range of 6.5-9.0 specified in the water quality standards with the exception of Jones Spring on November 8, March 23, and May 9.

Oil & Grease
All of the sample analysis results for oil & grease met the water quality standard of 10mg/l with the exception of the results for Pea Ridge Creek on November 8 and March 8.

BOD and COD
The levels for BOD and COD should not cause dissolved oxygen levels to fall below the water quality standard minimum of 5mg/l. Dissolved oxygen measurements were taken in-stream at the time of sampling with an Oakton pH/DO meter. The levels ranged from 7.12 to 17.94mg/l.

TSS and TDS
There are no numeric criteria in the water quality standards for TSS or TDS. The water quality standards include a narrative standard for solids to protect the beneficial uses of the stream. The sampling results for TSS range from <1 – 7mg/l. TDS levels in streams can vary greatly depending on natural background levels. Significant increases in TDS beyond the normal range for a given stream can interfere with the beneficial uses of the stream. The TDS results for all of the sites on March 8 and for Pea Ridge on May 9 are noticeably higher than the normal range of results seen over the past 3 years.

Nitrogen and Phosphorus
With the exception of Pea Ridge Creek, the sampled streams as well as Jones Spring are in the James River watershed. The James River Total Maximum Daily Load (TMDL) provides nutrient target recommendations of 0.075 mg/l for total phosphorus and 1.5 mg/l for total nitrogen for "…all classified streams and rivers that feed into impaired segments of the James River" (MDNR 2001). Total nitrogen is defined in the James River TMDL as kjeldahl nitrogen plus ammonia nitrogen. In the parameters listed in the Permit, total kjeldahl nitrogen (TKN) is equivalent to this definition of total nitrogen. All of the results for TKN for the sampling sites in the James River watershed meet the TMDL nutrient target recommendation for total nitrogen. All of the results for the sampling sites in the James River watershed exceed the TMDL nutrient target recommendation for total phosphorus.

Cyanide and Phenolics
The water quality standards for cyanide and phenol are 0.005mg/l and 0.1mg/l respectively. All of the results met these water quality standards.

Fecal Coliform and Fecal Strep
The water quality standard of 200/100ml for fecal coliform only applies to waters designated for Whole Body Contact Recreation and during periods when the waterway is not affected by storm water runoff. The sampled streams are not designated for Whole Body Contact Recreation.

Metals
All of the results for metals were below the detectable levels as shown in Table 10 except for the results for zinc. The results for zinc were above detectable levels and met the water quality standards which range from 241 – 422 ug/l (ppb) depending on the hardness value.

Table 9 - Representative Monitoring: Ambient and Wet-Weather Sampling Results

Site	Date	pH	BOD	COD	TSS	TDS	NH3-N	N+N	TKN	DP	TP	CN	Phenolics	O&G	FC	FS
South Creek at Golden Avenue	11/8/04	7.24	2	2	<1	147	<0.1	1.06	0.25	0.03	0.27	<0.005	<0.005	<1	135	95
	3/8/05	8.21	<4	<10	1	520	<0.1	0.83	0.41	0.02	0.22	<0.005	<0.05	3.4	50	10
	3/23/05	7.27	<2	<10	12	140	<0.1	0.66	0.74	0.02	0.25	<0.005	<0.005	2.4	560	1300
	5/9/05	7.49	2	66	6	140	0.41	0.31	1.24	0.09	0.27	<0.005	<0.005	<10	410	190
Jordan Creek at Bennett Street	11/8/04	7.64	2	3	1	347	<0.1	2.38	0.04	0.03	0.12	<0.005	<0.005	1.3	65	190
	3/8/05	7.96	<4	<10	1	760	<0.1	1.85	0.75	<0.01	0.21	<0.005	<0.05	<1	130	10
	3/23/05	7.4	<2	<10	10	220	<0.1	1.19	1.02	0.02	0.26	<0.005	<0.005	<10	1050	1300
	5/9/05	7.28	<2	24	<1	340	0.6	1.32	1.21	0.01	0.1	<0.005	<0.005	<10	230	10
Wilsons Creek at Farm Road 146	11/8/04	7.67	2	3	<1	307	<0.1	2.6	0.11	0.03	0.15	<0.005	<0.005	1.3	145	70
	3/8/05	8.42	<4	<10	2	800	<0.1	2.1	0.43	<0.01	0.2	<0.005	<0.05	<1	20	10
	3/23/05	7.31	<2	<10	8	240	<0.1	1.37	1.1	TF*	0.24	<0.005	<0.005	<10	450	700
	5/9/05	7.55	<2	61	<1	320	0.57	1.64	1.11	0.02	0.11	<0.005	<0.005	<10	110	40
Galloway Creek at Highway 60 (JRF)	11/8/04	7.83	1	3	3	240	<0.1	2.12	0.04	0.02	0.13	<0.005	<0.005	<1	85	205
	3/8/05	8.39	<4	3	<1	800	<0.1	2.21	0.22	<0.01	0.2	<0.005	<0.05	2.5	20	40
	3/23/05	7.57	<2	16	5	240	<0.1	2.02	0.25	0.04	0.23	<0.005	<0.005	<10	270	295
	5/9/05	7.72	2	64	<1	220	0.55	1.66	0.98	<0.01	0.13	<0.005	<0.005	<10	30	100
Jones Spring	11/8/04	6.45	1	<1	17	307	<0.1	3.44	<0.01	0.03	0.11	<0.005	<0.005	<1	90	40
	3/8/05	6.85	<4	<10	<1	760	<0.1	3.5	0.10	0.02	0.21	<0.005	<0.05	<1	10	<10
	3/23/05	6.45	<2	14	16	220	<0.1	1.85	0.5	0.03	0.25	<0.005	<0.005	<10	710	1195
	5/9/05	6.36	<2	65	<1	300	0.6	3.31	0.69	0.02	0.13	<0.005	<0.005	<10	130	<10
Pea Ridge Creek at Farm Road 102	11/8/04	7.45	2	3	<1	333	<0.1	2.46	0.13	0.05	0.13	<0.005	<0.005	12	280	265
	3/8/05	8.32	<4	<10	<1	720	<0.1	2.01	0.41	<0.01	0.21	<0.005	<0.05	76	90	10
	3/23/05	7.1	<2	<10	10	290	<0.1	1.92	1.78	0.05	0.24	<0.005	<0.005	<10	2250	3800
	5/9/05	6.93	<2	52	1	600	0.6	1.3	1.26	0.02	0.11	<0.005	<0.005	<10	470	30

Parameters are measured in mg/l (ppm) except FC and FS are colonies/100 ml. *DP sample for Wilsons Creek on 3/23/05 was contaminated; test failed.
Parameter Abbreviations: BOD = Biochemical Oxygen Demand; COD = Chemical Oxygen Demand; TSS = Total Suspended Solids; TDS = Total Dissolved Solids; NH3-N = Ammonia Nitrogen; N+N = Nitrate + Nitrite; TKN = Total Kjeldahl Nitrogen; DP = Dissolved Phosphorus; TP = Total Phosphorus; CN = Cyanide (Ammen); O&G = Oil & Grease; FC = Fecal Coliform; FS = Fecal Strep

Table 10 - Representative Monitoring: Ambient and Wet-Weather Sampling Results

Site	Date	CR	ZN	CD	PB	NI	AG	HG	SE	AS	SB	BE	TL	Hardness
South Creek at Golden Avenue	11/8/04	<10	<5	<5	<20	<10	<5	<20	<20	<20	<20	<20	<50	N/a
	3/8/05	<10	<5	<5	<20	<10	<5	<0.2	<20	<20	<20	<20	<50	197
	3/23/05	<10	<5	<5	<20	<10	<5	<0.2	<20	<20	<20	<20	<50	206
	5/9/05	<10	<5	<5	<20	<10	<5	<0.2	<20	<20	<20	<20	<50	179
Jordan Creek at Bennett Street	11/8/04	<10	12.7	<5	<20	<10	<5	<20	<20	<20	<20	<20	<50	N/a
	3/8/05	<10	8.8	<5	<20	<10	<5	<0.2	<20	<20	<20	<20	<50	288
	3/23/05	<10	12.4	<5	<20	<10	<5	<0.2	<20	<20	<20	<20	<50	162
	5/9/05	<10	<5	<5	<20	<10	<5	<0.2	<20	<20	<20	<20	<50	281
Wilsons Creek at Farm Road 146	11/8/04	<10	8.62	<5	<20	<10	<5	<20	<20	<20	<20	<20	<50	N/a
	3/8/05	<10	7.73	<5	<20	<10	<5	<0.2	<20	<20	<20	<20	<50	281
	3/23/05	<10	10.9	<5	<20	<10	<5	<0.2	<20	<20	<20	<20	<50	149
	5/9/05	<10	10.8	<5	<20	<10	<5	<0.2	<20	<20	<20	<20	<50	283
Galloway Creek at Highway 60 (JRF)	11/8/04	<10	<5	<5	<20	<10	<5	<20	<20	<20	<20	<20	<50	N/a
	3/8/05	<10	<5	<5	<20	<10	<5	<0.2	<20	<20	<20	<20	<50	248
	3/23/05	<10	8.98	<5	<20	<10	<5	<0.2	<20	<20	<20	<20	<50	114
	5/9/05	<10	<5	<5	<20	<10	<5	<0.2	<20	<20	<20	<20	<50	211
Jones Spring	11/8/04	<10	<5	<5	<20	<10	<5	<20	<20	<20	<20	<20	<50	N/a
	3/8/05	<10	12.8	<5	<20	<10	<5	<0.2	<20	<20	<20	<20	<50	304
	3/23/05	<10	7.93	<5	<20	<10	<5	<0.2	<20	<20	<20	<20	<50	172
	5/9/05	<10	5.51	<5	<20	<10	<5	<0.2	<20	<20	<20	<20	<50	318
Pea Ridge Creek at Farm Road 102	11/8/04	<10	<5	<5	<20	<10	<5	<20	<20	<20	<20	<20	<50	N/a
	3/8/05	<10	<5	<5	<20	<10	<5	<0.2	<20	<20	<20	<20	<50	290
	3/23/05	<10	5.85	<5	<20	<10	<5	<0.2	<20	<20	<20	<20	<50	220
	5/9/05	<10	5.36	<5	<20	<10	<5	<0.2	<20	<20	<20	<20	<50	285

Metals are measured in ug/l (ppb); hardness is Mg EQ CACO3/L. Method used for 11/8/04 analysis was Total Metals. Method used for 3/8/05, 3/23/05, and 5/9/05 analyses was Total Recoverable Metals for HG and Total Dissolved Metals for all other metals. Hardness was voluntarily added to parameter list starting on 3/8/05.

Parameter Abbreviations: CR = Chromium; ZN = Zinc; CD = Cadmium; PB = Lead; NI = Nickel; AG = Silver; HG = Mercury; SE = Selenium; AS = Arsenic; SB = Antimony; BE = Beryllium; TL = Thallium

6.4 Floatables Monitoring

Two monitoring locations have been designated for removal of floatables as required in Part V.B. of the Permit. These locations were identified as points of significant accumulation of debris based on the experience of Public Works personnel and the frequency of citizen requests for cleaning at these locations. It is estimated that 18 cubic yards of floatables were collected from location 1 and 20 cubic yards from location 2 during year three.

- Location 1 – Channel on the east side of Grant Avenue approximately 100 feet north of Portland Street
- Location 2 – Detention basin at the southwest corner of Carleton Street and Bothwell Avenue

Records will also be kept for the amount of trash collected through the Adopt-A-Stream program. The first year of the program will be reported on in the 2005-2006 annual report.

Figure 34 - Floatables monitoring location #1 at Portland and Grant

Figure 35 - Floatables monitoring location #2 at Carleton and Bothwell

6.5 Biological Sampling

The City has developed a program of periodic biological assessments of two urban streams as required in Part V.C. of the Permit. An explanation and rationale for the program was included in the second annual report. During year three, the City contracted with Missouri State University to perform biological assessments of Jordan Creek at Bennett Street and Galloway Creek at James River Freeway, two of the sampling locations for the Representative Monitoring Program detailed in Section 6.3. A Final Report to the City of Springfield on the Biological Assessment of Urban Streams is included in Appendix B. Biological assessments will continue in year four.

7.0 Summary of Modifications to the Storm Water Management Program

While it is anticipated that the current SWMP, which has served the public well, will follow the outlined activities of the Permit, City staff will continue to evaluate potential BMPs to further enhance water quality of the MS4. The activities required during year four of the Permit will be added to the SWMP. Beyond these additions, no modifications to the SWMP outlined in the Permit are proposed at this time.

8.0 Fiscal Analysis

Expense Item or Program	Funding Source[1]	Actual Expenses FY 02/03	Actual Expenses FY 03/04	Actual Expenses FY 04/05	Estimated Budget FY 05/06
Hard Costs [2]					
Staff: 2 full-time staff, mgmt and admin staff, 1 intern	SWBI and GF	76,000	82,000	67,000	80,000
Supplies & Equipment	SWBI and GF	10,000	3,000	6,000	6,000
GIS hardware/software	SWBI and GF	4,000	5,000	8,000	9,000
Training and Professional Services and Studies	SWBI and GF	30,000	43,000	68,000	50,000
Lab Services (sample analysis)	SWBI and GF	44,000	44,000	44,000	44,000
Education and Public Outreach	SWBI and GF, SSF, TF, LTF	1,869	2,500	9,900	10,000
State Permit Fee	SWBI and GF	2,350	2,350	2,350	2,350
Total		$168,219	$181,850	$205,250	$201,350
Soft Costs[3]					
Water Quality Improvement Projects	SWBI	653,615	800,000	1,200,000	1,000,000
Vegetation Management of Waterways & Basins	DBF, TF, GF	543,975	209,187	112,267	90,110
Tree Planting & Maintenance	GF	496,450	618,235	568,352	633,448
Solid Waste Division Education Program w/ water quality emphasis	LTF[4]	38,900	40,870	46,000	66,000
Household Chemical Collection Center	SS (50%), LTF (50%)	104,500	111,713	94,500	118,500
Yardwaste Recycling Center	LTF	348,000	238,977	329,000	336,000
Infiltration/Inflow Program	SSR	1,286,471	783,150	457,000	600,000
Floodplain Acquisition Program	SWBI	856,750	488,585	938,550	950,000
Debris collection – grate, waterway, bridge, and sinkhole routes	TF	30,000	98,382 [5]	114,888	126,400
Street Cleaning[6]	TF	491,000	462,842	563,734	548,252
USGS Coop. Stream Gauge Project	SWBI	17,300	17,300	18,600	25,000
Watershed Committee of the Ozarks	GF	41,000	41,000	41,000	41,000
James River Basin Partnership	GF	5,000	5,000	5,000	5,000
Total		$4,912,961	$3,915,241	$4,488,891	$4,539,710
Grand Total		$5,081,180	$4,097,091	$4,694,141	$4,741,060
3-Year Total Expenses				$13,872,412	

[1] **SWBI** – Storm Water Bond Issue funded by Level Property Tax; **GF** – General Fund; **SSF** – Sanitary Services Fund; **TF** – Transportation Fund; **LTF** – Landfill Tipping Fees; **DBF** – Detention Buyout Fund; **SSR** – Sanitary Sewer Revenue

[2] Hard costs are expenses for activities conducted solely for the purpose of compliance with Permit requirements.

[3] Soft costs are expenses for activities that are part of the Permit requirements and/or overall SWMP, but would be conducted by the City regardless of the Permit. Expenses do not include capital purchases.

[4] A small portion of funds for the Solid Waste Management Division Education Program, HCCC, and YRC comes from donations and from the sale of YRC products.

[5] The actual expenses for fiscal year 03/04 are an estimate based on expense records for December- June. Additionally, MoDot spends approximately $10,000 on curb inlet cleaning of state-maintained thoroughfares within the City limits.

[6] Includes personnel, services, and supplies for all street cleaning activities including sweeping, debris pickup, grate cleaning, and vacuuming ditches. Additionally, MoDot spends approximately $30,000 on sweeping state-maintained thoroughfares within the City limits.

9.0 References

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